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BILATERAL OSTEOTOMY OF THE RAMI FOR MARKED PROTRUSION OF THE LOWER JAW: REPORT OF A CASE

WILLIAM H. TRAYNHAM, JR.,* D.D.S., Hampton, Va.

THE case here presented is not only unusual, but is also one of the first of its kind to be handled in the Army. Information obtained from Drs. Ivy and Curtis, University of Pennsylvania, states that this operation has been performed successfully for the past ten years. However, it is not known to whom the credit belongs for the first operation. A few specialists in the field of maxillofacial surgery have been performing it with success in the various localities. Owing to the lengthy convalescent period and almost prohibitive expense, few persons have undergone this type of operation. Consequently, few articles have been recorded.

Fig. 1.—Profile view of patient before operation.

REPORT OF CASE

History.—The patient presented himself at the dental clinic at Morris Field, Charlotte, N. C., October 1, 1943, for the purpose of having some type of dental prosthesis constructed to qualify him for aerial gunner.

*Major (DC), U. S. Army; base dental surgeon, Morris Field, Charlotte, N. C.

It was noted that the lower anterior teeth extended almost an inch beyond the ridge of the maxilla and that, in closing the jaws, the patient's lower teeth touched the nose. Since only three upper molars and two peg-shaped cuspids remained, it was impossible for the patient to make any type of occlusal contact. Full upper and lower dentures were first considered, but after study models were constructed, this was ruled out owing to the marked protrusion of the lower jaw.

The patient was not qualified for overseas service and was definitely disqualified as an aerial gunner because of this condition. On observing the patient for several days, it was noted that he had an inferiority complex because of his abnormal facial expression, resulting from the type of prognathism present. On finding that he was extremely anxious to have the deformity corrected in order to be kept in the military service, the operation was regarded as definitely indicated.

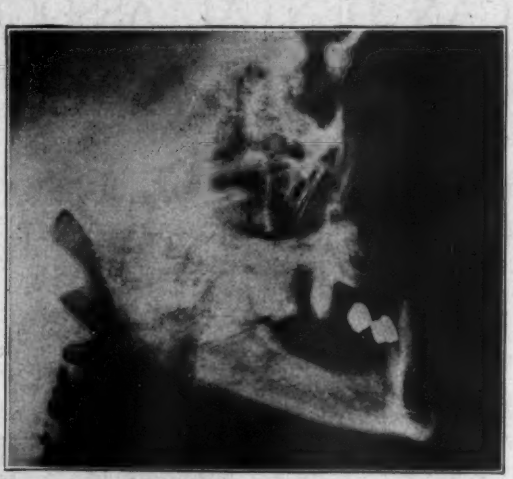

Fig. 2.—X-ray film taken before operation, lateral view.

Fig. 3.—X-ray film, lateral view, taken before operation.

Examination.—Oral examination revealed that, in the upper jaw, on the right side, there were a peg-shaped cuspid in the region of the second bicuspid and a second and a third molar. On the left side, only a peg-shaped cuspid and a second molar remained. The lower jaw contained six normal anterior

teeth and the two first bicuspids, which had full cast gold crowns. The general health of the patient was good and the oral condition normal.

Construction of Acrylic Splint and Establishment of Centric Relation.—Upper and lower hydrocolloid impressions were taken, poured in stone and mounted on an articulator. Here the problem arose as to how much the lower jaw was to be moved back

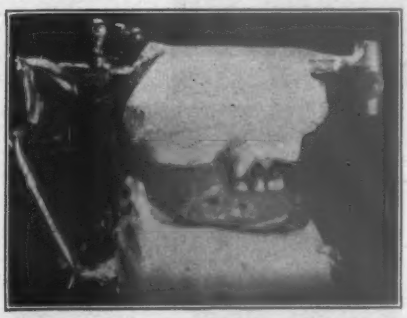

Fig. 4.—Centric relation established on articulator; showing upper molar teeth fitting into wax biteblock which was made into acrylic splint.

Fig. 5.—Occlusal view of wax splint.

by the operation. To determine this, the lower cast was moved back to the approximate position that would result in normal occlusion. Since partial dentures were to be constructed for the case after the operation, the main point of importance here was the amount of overjet that was to be produced.

After centric relation was established on the articulator by moving the lower cast back to the position that was desired, an acrylic splint was constructed for the lower jaw. (Fig. 4.)

Two thicknesses of wax were placed around the labial and lingual surfaces of the lower teeth and a bite-block was formed on the posterior ridge for the upper molars to rest in. (Fig. 5.) Wires bent into hooks were placed in this block. The case was then invested and flasked, with colored acrylic as the material of choice.

After the acrylic splint had been adjusted and wired together in the patient's mouth, another problem presented itself, as to how to stabilize the lower jaw in correct relationship to the upper teeth after its fracture and during the period of healing. Since the only teeth remaining were peg shaped and did not offer sufficient retention for any type of

Fig. 6.—Occlusal view of upper model; showing how rubber bands were attached to labial surfaces of maxillae by means of buttons attached to palate.

wiring, another method was used. Wires were passed through the ridge of the maxilla to the lingual aspect (Fig. 6), buttons were threaded on and the wires passed back through the same opening to form loops on the buccal and labial surfaces, to which elastic bands were attached which were to connect them to the hooks on the lower splint after the operation. With the acrylic splint in place and the elastic bands in their proper positions, the patient was ready for the operation.

Surgical Procedure.—The following morning, the patient was prepared for the operat-

Fig. 7.—Gigli saw in proper position.

Fig. 8.—X-ray film taken one week after operation.

Fig. 9.—Profile view of patient after operation.

ing room. Sixty grains of sulfadiazine was given as a prophylactic measure and sodium pentothal was used as the anesthetic of choice. The anatomic landmarks were observed; i.e., an imaginary line was drawn from the tip of the mastoid process to the lower border of the malar bone. A small vertical incision was made on the imaginary line, posteriorly from the border of the ramus of the mandible. A conductor for the Gigli saw (or conductor for Jeffery's saw) was passed, going between the periosteum and the bone. Once the conductor was under the periosteum and had passed under the posterior border of the ramus, pressure was exerted outward and the conductor passed forward. Here, precaution was taken to be sure that sufficient outward pressure was applied to keep the conductor between the periosteum and the inner surface of the ramus. (If this procedure is followed, the conductor will pass between the mandibular artery and nerve, thus protecting them from

being severed when the saw is pulled back through the opening). The conductor was then pushed on forward until a protrusion was noted in the cheek at the lower border of the malar bone. A small horizontal incision was made at this point and the point of the conductor was passed up through this opening. A piece of wire was then used to fasten the Gigli saw on to the conductor and the instrument was pulled back, thus bringing the saw back through from the opening that had been made by the conductor. Handles were attached to the ends of the saw and the ramus of the mandible was then mechanically fractured. (Fig. 7.) The same procedure was carried out on the opposite side, thus producing a bilateral fracture of the mandible. Fine silk was used to suture the four incisions, with care to avoid facial scars.

Fig. 10.—Anterior view of patient after operation; showing partial dentures in place.

The elastic bands from the buccal and labial surfaces of the maxilla were attached to the lower acrylic splint, thus retruding the mandible into a centric position that had previously been established; with the upper posterior teeth occluding in the indentations with the prepared acrylic splint.

Postoperative Care.—An ice collar was kept on the face for the next twelve hours and one-sixth grain of morphine was given as a sedative. For the next few days, swelling was of moderate degree and the patient rested comfortably. Hydrogen peroxide and saline mouth washes were used and sulfadiazine was continued in the dosage of 15 grains every four hours for two days after the operation.

Fluids were forced, and since the patient did not have any upper anterior teeth, sufficient space was present to allow cereals and soft creamy foods to be taken rather readily.

Course.—Recuperation of the patient was uneventful. After the second week, the rubber bands were replaced as they had lost their elasticity. It was observed that the traction from the elastic bands held the upper teeth in the proper indentations in the lower acrylic splint, thus giving the fractured jaw a chance to heal in the centric relation that had been established.

X-ray pictures showed that the mandible had been moved posteriorly about three-quarters inch. (Fig. 8.) It was noted that the tongue had smaller space to occupy and gave the illusion of being almost twice its original size.

After the fourth week, the buttons were removed from the roof of the mouth and normal function of the mandible was observed. The acrylic splint was kept on the lower teeth in case any change took place in centric relation, as it would have been very easy at that point to connect the splint to the upper teeth in the event the fracture did not have proper union. On observing the patient every day for the next week, it was noted that no changes took place in centric relationship. All functional movements were the same as they were before the operation and no pain whatsoever was evidenced by the patient in performing the various movements of the mandible.

In the fifth week, the splint was removed, the crowns of the teeth were polished and hydrocolloid impressions were made for the construction of partial dentures.

SIALADENITIS AND SIALODOCHITIS
DIAGNOSIS AND MANAGEMENT

GEORGE D. WOLF, M.D., and DAVID SOLOWAY, M.D., New York, N. Y.

THE desire to stimulate greater interest in the diagnosis and management of the diseases involving the salivary glands and their neighboring structures has prompted a further review of this subject.

Because of its comparative rarity and benignity, this condition frequently exists unrecognized over a period of years with or without damage to the gland substance or serious interference with the well being of the patient. Yet here and there a case or a report of a case is encountered wherein a simple obstructive disease with mild secondary inflammatory changes has been mistaken for a serious involvement of the floor of the mouth (Ludwig's angina) and radical incisions were unnecessarily made. In rare instances, the infection travels down the neck, causing bacteremia and thrombosis of the subclavian vein, actually endangering the life of the patient.

Breidenbach reports such an instance in a woman aged 21 who, on admission to the hospital, gave a history of pain and swelling of the left side of the floor of the mouth and difficulty in swallowing of four days' duration. She also stated that for six months she had had recurrent attacks of pain and swelling on that side, which were especially noticeable on eating sour foods, but which subsided within from twenty-four to forty-eight hours. She had a temperature of 102° F., pulse 108 and respiration 22 at the time of admission. Though a calculus was removed from Wharton's duct and flow of free pus followed, the patient developed a chill and 103.5° temperature on the sixth day after admission. In spite of a free incision in the neck, chills persisted, the temperature rose to 107° and the blood culture was positive for *Staphylococcus albus*. After extensive surgical procedures, including splitting of the clavicle and exposure of a thrombosed subclavian vein, with ligation and excision thereof, the patient made an uneventful recovery.

The salivary glands are not immune from malignancy, and here early and thorough surgical measures may be a life-saving procedure.

CASE 1.—R. M., a woman, aged 37, first seen in February 1925, had an irrelevant past and family history. She had been referred by her family physician with a history of a small growth in the region of the left cheek, in front and below the left ear, observed about ten months earlier. For the past two or three weeks, it had been growing rapidly. There was no loss of weight; the patient had no pain, and, what was more important, the tumor did not increase in size during mastication. The doctor whom she had consulted thought it was a cyst, but several attempts to aspirate fluid were fruitless. On examination, there was a subcutaneous tumor the size of a pigeon's egg along the left parotid region. It was not tender to touch or adherent to the skin or underlying structures. Since routine examination could not determine the nature of the growth, and since it was definitely not due to an obstruction of the parotid (Stenson's) duct, nor did it appear to involve the gland itself, removal of the tumor by an external incision was advised. The patient was

From the Department of Otolaryngology, New York Medical College, J. A. W. Hetrick, Director.

hospitalized and under infiltration anesthesia, a vertical incision about 2 inches long and about three-fourths inch wide in front of the auricle was made. A round encapsulated tumor was peeled out with ease. Because of the pinkish hue of the mass, which resembled a lipoma, the specimen was sent to the laboratory, which subsequently reported it to be a large round-cell sarcoma. The patient was later referred to Dr. Maurice Lenz for radium therapy. She was given 3,000 millicurie hours in a period of nine hours and forty-four minutes with a radium tray on a block of wood 4 by 6 cm. distance and 2 mm. brass filter. She was seen recently, eighteen years later, and reported having been in good health since the operation.

ANATOMY[1]

The parotid gland, the largest of the three salivary glands, is a compound racemose gland with a serous secretion. It weighs from 14 to 28 gm. and lies below the external acoustic meatus between the mandible and the sternocleidomastoid muscle, and is enclosed within a capsule with the deep cervical fascia. This gland is separated from the pharyngeal wall by some loose connective tissue, which communicates with the parotid space by means of a gap between the styloid process and the internal pterygoid muscle. Because of this communication, a retropharyngeal or parapharyngeal abscess may push the parotid gland outward.

The posteromedial surface is molded on the mastoid process and the sternocleidomastoid muscle to the posterior belly of the digastric and the styloid process. The external carotid artery grooves this surface before it enters the substance of the gland.

Structures Within the Gland.—The external jugular vein is formed within the gland and emerges from the lower side. The facial nerve enters the gland posteriorly and passes through it obliquely so as to become more superficial as it travels forward, lying laterally from the external carotid artery and jugular vein. Before emerging from the gland, the facial nerve breaks up into its two great divisions, the branches of which begin to divide within the substance of the gland. The sensory nerves of the gland, the auriculotemporal and the greater auricular, are bound up in the unyielding parotid fascia, which accounts for the excessive pain in acute inflammation and in rapidly growing tumors of the gland.

The parotid (Stenson's) duct, which is about 5 cm. long and 3 mm. in diameter, begins as numerous branches from the anterior part of the gland. It lies one finger's breadth below the zygomatic arch and, when the teeth are clenched, may be rolled up and down against the tense masseter muscle. The course of the duct on the masseter may be represented by a line drawn from the lower margin of the concha of the ear to the commissure of the lip. It crosses the masseter muscle and its anterior border turns inward at nearly a right angle, pierces the buccinator muscle, runs between the buccinator and the mucous membrane of the mouth and opens upon a small papilla on the oral surface of the cheek opposite the second upper molar tooth. While crossing the masseter, it receives the accessory duct. In this position, it lies among the branches of the facial nerve.

The submaxillary gland, which is irregular in form, is about the size of a walnut, and weighs about 8-10 gm. The greater part is situated in the submaxillary triangle, just below the angle of the jaw. It is covered by skin, platysma muscle and deep cervical fascia and is crossed by the anterior facial vein. It rests on the hyoglossus, mylohyoid and styloglossus muscles. A deep prolongation extends to the sublingual region through the clefts between the mylohyoid and hyoglossus muscles. The external maxillary artery is embedded in a groove in the posterior border of the gland. The submaxillary duct, which is about 5 cm. long, begins by numerous branches from the deep sur-

face of the gland, extending from the gland beneath the mylohyoid muscle along the floor of the mouth, and opens by a narrow orifice on the summit of a small papilla. At the side of the frenulum linguae on the hyoglossus muscle, it lies between the lingual and hyoglossal nerves. At the anterior border of the muscle, it crosses the lingual nerve and is then placed upon it. The terminal branches of the lingual nerve ascend on its medial side. This close relationship of Wharton's duct to the lingual nerve is of the utmost importance to the surgeon endeavoring to remove calculi in this portion of the duct. The crossing of the lingual nerve may also cause a constriction and tend to formation of calculi.

The sublingual gland, the smallest of the three salivary glands, is situated beneath the mucous membrane of the floor of the mouth at the side of the frenulum linguae and weighs nearly 2 gm. It is in relation above with the mucous membrane of the mouth, which it raises in the form of a crest, named plica sublingualis; below, with the mylohyoid.

Its excretory ducts number from eight to twenty. Of the smaller sublingual ducts (ducts of Rivinus), some join the submaxillary duct, others open separately into the mouth on the plica sublingualis. One or more join to form the larger sublingual duct (duct of Bartholin), which opens with or near the submaxillary duct.

PHYSIOLOGY AND CHEMISTRY[2]

Functions of the Saliva.—These functions are: (1) digestive action, (2) preparation of food for swallowing by altering its consistency, (3) a solvent action, (4) a cleansing action, (5) a moistening and lubricating action, (6) excretory action and (7) regulation of the water balance of the body.

The secretion of saliva is brought about reflexly in two ways: through stimulation of the nerves of the mouth by the presence therein of food or other substances or the stimulation of some organ of sense other than taste.

The afferent limbs of the reflex are (1) the secretory fibers of the chorda tympani nerve and (2) the tympanic branch of the glossopharyngeal nerve.

The efferent pathways are long fibers contained in the trunks of the chorda tympani, glossopharyngeal and lingual nerves. The reflexes are brought about through the salivary centers.

Composition of the Saliva.—Human mixed saliva, according to the investigation of Starr, is slightly acid in reaction. The pH varies between 6.35 and 6.85. The hydrogen ion concentration is found to vary with the carbon dioxide content of the blood. The amount secreted in twenty-four hours varies from 1,200 to 1,500 cc. Ordinary mixed saliva contains 99.3 per cent of water and 0.7 per cent of total solids. Of the three forms of saliva which contribute to the mixture found in the mouth, the sublingual is richest in solids, 2.75 per cent; the submaxillary secretion comes next, with from 2.1 to 2.5 per cent; while the parotid saliva is poorest in total solids, only from 0.3 to 0.5 per cent, and contains no mucin. Saliva has a specific gravity between 1.002 and 1.008, with about 0.7 per cent of solid matter. About 0.5 per cent is organic and 0.2 per cent inorganic. Of the organic material, about 0.4 per cent is protein, chiefly mucin, with small amounts of albumin and globulin. Normal saliva contains no glucose.

CLASSIFICATION

For convenience, diseases of the salivary gland may be classified as follows:

1. Inflammatory: (a) acute, specific or non-specific; (b) acute, primary or secondary; (c) chronic.
2. Obstructive: (a) calculosis; (b) stenosis of the salivary duct.
3. Fistulous.
4. Neoplastic: (a) benign; (b) malignent.

Of the acute specific diseases, the most common are:

1. Parotitis or mumps.

2. Uveoparotic fever, a painless enlargement of both parotid glands with a concomitant involvement of the uveal tract of both eyes. Occasionally, there is a facial paralysis, burning sensation of the tongue, swelling of the lachrymal glands, polyuria and polydypsia and general adenopathy with splenomegaly. The medicaments are mercury, iodine, gold, arsenic, bromides and potassium.

3. A very rare acute primary suppurative parotitis occurring in infants, young children and even the newborn,

Fig. 1.—Calculus in submaxillary duct.

the last having been reported by Bloch and Pacella (quoted by Beck).[3]

4. Mikulicz's disease or syndrome.[4] Some authors doubt the existence of such a disease entity. Mikulicz described this syndrome in 1888. In brief, it consists of a swelling of the lachrymal glands followed by successive involvement of the submaxillary and the parotid glands. The course is afebrile. There is no change in the blood picture. The disease is essentially chronic and never fatal. Mikulicz thought it was caused "by an infectious or parasitic process in the broadest sense of the word."

Among other specific diseases, actinomycosis, syphilis and tuberculosis have been encountered, but these are rare.

In the obstructive type of sialadenitis, calculi are the major causative agents. Next in line are strictures of the ducts.

ETIOLOGY OF CALCULUS FORMATION

There are a number of theories regarding the way calculi are formed. The French speak of *diathese calculaire*, and some refer to this as the arthritic diathesis of Wright (Joachim),[5] while others think that it is due to tartar detachment from the teeth finding its way into the ducts. Also, calculus formation

Fig. 2.—Calculus in submaxillary gland. (Figures 2, 3 and 4 from "Surgical Operations of the Head." New York: Allied Boon Co., 1934.)

has been variously ascribed to dental caries, gout, systemic infections and endocrinopathy.

Essentially, there are two schools of thought. According to Kuttner, Hanger and Kroiss (quoted by Tholen),[6] calculi are the result of an inflammatory process in the gland itself. Its epithelium is destroyed under the influence of salivary digestion (Graille) and the débris collects in lumps and thus furnishes a nucleus for concrement forma-

tion. The other theory is sponsored by Maas and Klebs and also by Gallipe and Naesland and Soderlund, who claim that it is due to the high mucoid content of the saliva.

Since the submaxillary gland secretes a higher content of mucin than the parotid gland, and since the former is the most common seat of calculi, we can give credence to the latter hypothesis. Of ninety-one cases recently reviewed by Tholen,[7] seventy-six, or 85 per cent, were in the submaxillary gland.

Sex.—It is variously estimated to be twice as frequent in the male.

Age.—The youngest patient on record, reported by Burdel and Cloquet (quoted by Neuhof),[7] was a boy aged 3 weeks. It also may occur after the age of 70.

Symptomatology.—The symptoms vary with the location of the calculus, according to whether it is in the duct or the body of the gland. The symptoms are more severe when it is in the duct. Symptoms also depend on the size of the calculus and whether it is single or multiple. The calculi may be only the size of a pea or a seed. On the other hand, one weighing 70 gm. was reported by Orth (quoted by Blady and Hocker).[8]

Usually, the patient claims that, for some time past, he has noticed an intermittent pain in the submaxillary or parotid region, manifested mostly during eating. There is a swelling of the corresponding gland, which reaches its height soon after meals and subsides. This is an important symptom, as it often clinches the diagnosis. When the pain is severe, it is frequently referred to as salivary colic.

CASE 2.—L. K., a man, aged 32 years, gave a history of intermittent attacks of pain and swelling in the region of the left lower jaw, during intake of food, for the past few years. On bimanual examination, a calculus was felt at the orifice of the left Wharton's duct. X-ray examination (Fig. 1) confirmed the clinical diagnosis.

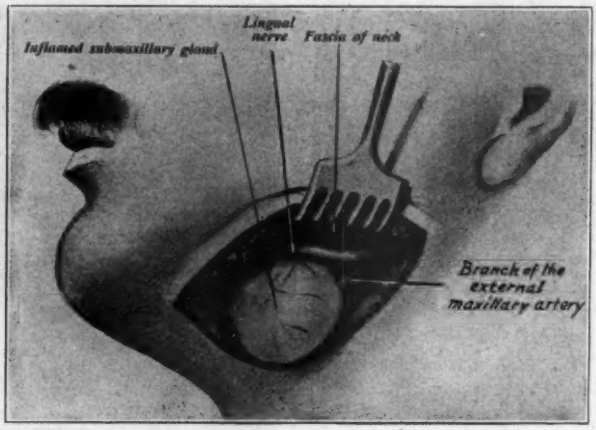

Fig. 3.—Exposure of enlarged submaxillary gland.

Under local anesthesia, the duct was slit and a calculus was removed. The symptoms cleared up promptly.

Diagnosis.—In typical cases, when the presence of a calculus is suspected, the problem is usually not difficult. The chief clue is a swelling of the gland during meals with subsidence shortly thereafter. This can sometimes be demonstrated by making the patient chew gum or a piece of lemon. Palpation is next in order. In parotid gland involvement, one hand is held externally over the cheek,

and slight pressure is applied. With a gloved finger of the other hand, the parotid duct is felt throughout its length. In submaxillary gland calculus, one hand is held internally from the mandible and gentle pressure is applied upward, elevating the floor of the mouth. Similarly, the submaxillary duct is explored. It is most common to feel the stone if it is in the duct. Exploring the duct with a thin bulbous-tip silver probe will often elicit a click when the probe strikes the calculus.

The x-rays will show the location of the stone when it is radiopaque. When the clinical diagnosis is reasonably certain and the x-ray picture is negative, a dental film should be tried. Some stones are not easily recognized because of the superposition of dense structures. Here, sialography may settle the doubtful case. In nonopaque calculi, sialograms will demonstrate a dilatation of the duct beyond the calculus. Extensive dilation of the duct[8] distally from the gland indicates the presence of calculi.

Treatment.—When the stone is in the duct, in mild cases, watchful waiting plus occasional probing may be advisable, as calculi have been known to be expelled spontaneously. When this fails or when the symptoms are severe, surgical removal is the only recourse. In the submaxillary gland, the stone is most accessible when it has reached the posterior border of the mylohyoid muscle. Removal is carried out under topical and local anesthesia.

Technic.—The same manipulation should be employed as in examining for calculi. If the stone is located, the mucous membrane is slit and removal is carried out with forceps. The wound is not sutured, as a new orifice of the duct is of no importance. Sometimes slitting the duct throughout its length, guided by a previously introduced probe, may be advisable.

When the stone is in the body of the gland, and fortunately it is most frequently in the submaxillary gland, extirpation of the gland is the only means of effecting a cure.

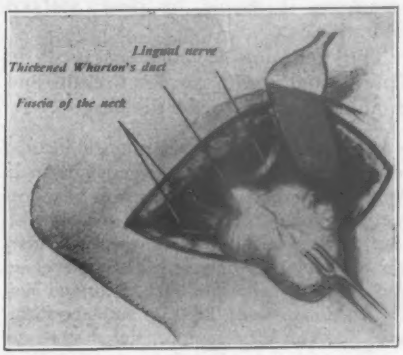

Fig. 4.—Removal of salivary gland.

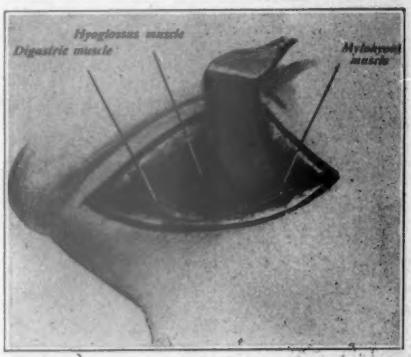

Fig. 5.—Floor of wound cavity.

Complications.—When a calculus remains either in the duct or, as happens most commonly, in the body of the gland, for some time, hypertrophy or, in most cases, suppuration of the gland may occur. This may happen because the calculus is asymptomatic or because of failure on the part of the patient to seek early relief. In these instances, the history varies in some details. There may be a history of spontaneous expulsion or surgical removal of a calculus. For a number of years, the patient may have noticed an enlargement of the gland with additional swelling during

meals, but, in addition, there is always drainage of foul smelling thin pus from the orifice of the duct. X-ray examination or palpation may not reveal a stone.

CASE 3.—M. C., a woman, aged 45 years, complained of swelling in the left side of the neck of twenty years' duration, which increased in size during eating. For the past few years, foul smelling pus had been welling up from the floor of the mouth. An x-ray examination was negative for a calculus. Manual examination revealed that the left submaxillary gland was about three times the normal size. On pressure, pus exuded into the mouth. Under local anesthesia, an incision was made about three-fourths inch below the margin of the jaw,

Fig. 6.—Probe in parotid duct.

and 4 inches long. The submaxillary gland, including Wharton's duct, was exposed and resected.

CASE 4.—J. M., a man, aged 36 years, complained of a markedly swollen gland on the right side of the neck of four days' duration. He had had a similar condition about a year before, when the family physician removed a salivary calculus by the oral route. Since that time, a foul smelling discharge had been oozing from the floor of the mouth. Swelling and the quantity of exudate increased during the intake of food.

On examination, a markedly increased right submaxillary gland was found which was tender to touch. On the right side of the frenulum, a sinus was visible which filled with pus when the gland was pressed. An x-ray film (Fig. 2) showed a moderately large calculus in the body of the gland.

Diagnosis.—A diagnosis of chronic infection of the right submaxillary gland, with a calculus, was made.

In doubtful cases, a differential diagnosis of benign or malignant tumor, cyst, actinomycosis, cellulitis, epidemic parotitis, syphilis, tuberculosis, lymphadenitis and ranula should be considered.

In clear-cut cases of suppuration of the gland, no form of conservative treatment short of extirpation of the gland will bring about a cure. In the parotid, the proximity of the facial nerve makes the procedure hazardous. In the submaxillary, it should be done without hesitation.

The following technic was used[9] in Cases 3 and 4 with excellent results and prompt cessation of the discharge:

Under infiltration anesthesia, an incision was made parallel to the lower jaw from in front backward, a finger's breadth below its margin, through skin, fat, platysma and fascia, exposing the surface and the lower margin of the gland. (Fig. 3.) Then the gland and its thickened capsule, transformed into a hard tumor, were lifted up with the finger and, by blunt dissection, separated from the mylohyoid muscle below; whereupon, a large vein which ran close to the tumor had to be double tied and divided. As the gland was detached from the substrata, a salivary stone came in view at its anterior margin. As the dissection continued, the facial artery was revealed at its posterior upper margin, giving off a branch to the gland. This branch was immediately tied, but the main vessel itself was displaced backward and upward, and not further disturbed.

The gland, freed still further from above by blunt dissection, could finally be displaced from the wound, and the lingual nerve also came in view at the upper margin of the tumor. It was intimately attached to the capsule of the gland and had to be dissected out by scissors. (Fig. 4.) When this had been done, the gland hung only by its duct (Fig. 5), which was put under strong tension by seizure with forceps, pulling it

upward, and was divided close to and under the oral mucous membrane, together with the facial artery. The nerve remained wholly unharmed.

At the floor of the oral cavity (Fig. 6), after extirpation of the gland, the digastric, mylohyoid and hyoglossus muscles were exposed under the mucous membrane. No deep sutures were placed on account of the danger of infection. The wound cavity was loosely packed with iodoform gauze and the skin alone was united by a few sutures over the packing, thus avoiding injury to the lingual and hypoglossal nerves.

The operation resulted in prompt cessation of the symptoms and the scar was almost invisible. The functional and cosmetic results were excellent.

An experience with Case 5 may be worthwhile recording:

The x-rays (Fig. 2) revealed a calculus in the body of the gland. Yet a careful search failed to reveal this either in the gland or in the operative field. On the seventh day after operation, there was a foul discharge from the wound. This continued for several days in spite of persistent cleaning and suction of the wound. The impression was gained that this was due to the presence of a foreign body, most likely a sponge, left in during operation. On the fourteenth day after operation, when a revision of the operation was considered, a large calculus emerged when the packing was removed. The discharge ceased promptly thereafter and the patient made an uneventful recovery.

Calculi of the Parotid Gland.—Here, because of the danger of injury to the facial nerve, as well as the possibility of causing a parotid fistula, extreme conservatism should be practiced.

If the calculus is in the body of the gland and is causing no particular discomfort to the patient, it is probably best left alone. If situated in the duct, repeated dilation of the canal will frequently bring about expulsion of the calculus.

CASE 5.—D. McP., a man, aged 54, complained that for the past five days he had experienced increasingly severe pain and swelling in front of the left ear. These symptoms were aggravated during meals. He also had some trismus on that side. The past history was negative.

On examination, there was moderate swelling over the left parotid, which was very tender to the touch. On pressure, some thick pus exuded from the parotid duct orifice.

An x-ray examination did not clearly indicate the presence of a calculus. Probing of the duct (Fig. 7) elicited a distant click. After withdrawal of the probe, a considerable amount of pus was exuded, and, incidentally, there was relief from pain. For the following three days, the parotid duct was probed and dilated with a lachrymal dilator. On the fourth day, the patient came into the office and brought a small spongy mass that resembled a calculus. All the symptoms cleared up and the patient has been perfectly comfortable.

In simple obstructive cases of the parotid duct without a calculus, Pelner[10] suggests the hypodermic injection of 1 cc. of prostigmine methylsulfate 1:2,000. He observed that, within from twenty-five to thirty minutes, there was a profuse watery secretion from the parotid gland. In two of the four patients so treated, the gland diminished in size and tenderness disappeared.

SIALODOCHITIS

Inflammation of the salivary duct is of unknown origin. Many varieties of sialodochitis have been described. The fact that bacteria, although normally found in Stenson's duct, are not common to Wharton's may account for the inflammatory reactions of or cicatrices in the latter.

One variety, sialodochitis fibrinosa of Kussmaul, is characterized by sudden and recurrent attacks of duct obstruction caused by fibrin plugs. It is usually bilateral.

Neuhof[11] reports a cicatricial stenosis of Stenson's duct. This is usually unilateral, manifesting itself in a nodular enlargement of the affected parotid

gland. It has a tendency to recur even after slitting of the mouth of the duct, but it is ultimately cured after the stenosis is corrected. It may be readily mistaken for a sarcoma or a mixed tumor.

Salivary fistulas of the parotid are the result of (1) trauma, (2) abscesses and ulcerations, (3) necrosis or (4) surgical operation. They may also be congenital.

Treatment.—Curetting, cauterizing or formation of a plastic flap may be employed in treatment. There have been a number of operations devised for closure of fistulas. DeGuise[12] threads a piece of silk through two needles into the mouth so that the silk will embrace a bit of tissue 0.5 cm. in length. The silk thread is tied tightly within the mouth; the ends are cut off, and the margins of the fistula at the surface are freshened and sutured.

Tumors.[13]—The tumors may be classified as (a) benign: parotid cyst, Mikulicz's disease, adenolymphoma, adenoma, mixed, fibroma, lymphoma and hemangioma; and (b) malignant: carcinoma, endothelioma.

Diagnosis.—It is virtually impossible to determine before operation the exact type of tumor present. Mixed tumors of the salivary gland are the most common lesions seen in this region. It is estimated[14] that 11 per cent of the tumors of the salivary gland are malignant.

Differential Diagnosis.—The usual diagnostic criteria applying to superficial tumors elsewhere, such as duration, age, pain, mobility and adenopathy in the neighborhood of the growth, should be considered. Blair and Olch[15] offer the differentiation between carcinoma and malignant mixed tumors shown in the accompanying table.

Sialography may also be of assistance. According to Jacobovici, Papolitza and Albu,[16] Carpyway was the first to inject iodized oil into the parotid duct for the purpose of visualization of the duct. Kimm, Spies and Wolfe[17] contend that its usefulness is limited to determining the exact location of the lesion. It does not indicate whether it is malignant.

Blady and Hocker,[18] on the other hand, claim that since the use of iodized oil enables one to visualize the entire duct system, sialograms are typical and help to differentiate between mixed tumors and carcinomas. In the former, they maintain, the filling defect is seen as an orderly displacement or distortion of the duct system, while, in the latter, there may be regular filling defects in the gland and duct substance, localized diffusion or "puddling" of the opaque substance and incomplete filling of the duct system.

Hemangiomas are compressible and promptly refill when pressure is released.

Prognosis for benign tumors is good; for carcinomas, very bad.

Treatment.—Mixed tumors of the salivary glands have long baffled the medical profession and have long been a subject of controversy. In a recent excellent review of the subject, McFar-

DIFFERENTIATION BETWEEN CARCINOMA AND MALIGNANT MIXED TUMORS

	Carcinoma	Malignant Mixed Tumors
Age of appearance	Usually over 40	Usually in young adult
Duration	Few months to three or four years	Never undergoes malignant change in less than ten years
Size	Small or medium	May be large
Pain	Early and always present	Later—always present
Facial paralysis	Usually present	May be absent

land[19] arrives at the following conclusions:

The mixed tumors of the salivary glands are a group by themselves. It is impossible to be dogmatic about them for they disregard every canon of ontology and continually do the most unexpected things. It is impossible through the microscopic study of their structures to foretell what any of them will do. Any variety may recur. The long delay before recurrence deludes the surgeon and roentgenologist into believing that he has been successful in his treatment, when no good at all has resulted. The same long delay and occasional recurrence of the tumor twenty, thirty or forty years after operation justifies the question, "Is any patient once the victim of such a tumor ever cured?"

Dockerty and Mayo[20] recommend radical surgical measures in all primary tumors of the salivary gland.

Radiotherapy.—In the opinion of Popp,[20] microscopic diagnosis should be established prior to any form of irradiation, particularly in dealing with a special group of lesions which, in past experience, have not been benefited by irradiation. In dealing with cylindroma, intensive irradiation should be attempted after radical surgical removal.

BIBLIOGRAPHY

1. CALLANDER, C. L.: Surgical Anatomy. Ed. 2. Philadelphia: W. B. Saunders Company, 1939, pp. 162-164.

2. BEST, C. H., and TAYLOR, N. B.: Physiological Basis of Medical Practice. Ed. 3. Baltimore: Williams and Wilkins, 1943, pp. 695-707.

3. BLOCH, H., and PACELLA, B. L.: Suppurative Parotitis of New-Born; Report of 2 Cases. *Arch. Pediat.*, 54:681, November 1937; quoted by BECK, A. L.: Inflammation of Salivary Glands. *Surg., Gynec. & Obst.*, 74:604-606, February 16, 1942.

4. MIKULICZ, J.: *Med. Classics*, 2:165-186, October 1937.

5. JOACHIM, H., in Tice's Practice of Medicine. Hagerstown, Md.: W. F. Prior, Inc., 1932, vol. 7, pp. 1-6.

6. THOLEN, E.: Calculus of Salivary Gland. *Arch. Otolaryng.*, 35:761-765, May 1942.

7. NEUHOF, H.: Sialolithiasis and Sialodochitis in Childhood. *Am. J. Dis. Child.*, 11: 232-239, 1916.

8. BLADY, J. V., and HOCKER, A. F.: Application of Sialography in Non-Neoplastic Diseases of Parotid Gland. *Radiology*, 32:132-141, February 1939.

9. KRAUSE, F.; HYMANN, E., and EHRENFRIED, A.: Surgical Operations of Head. New York: Allied Book Company, 1934, vol. 11, pp. 422-423.

10. PELNER, L.: Parotid Obstruction Without Calculus. *Am. J. Digest. Dis.*, 9:417-419, December 1942.

11. NEUHOF, H.: Acute Nonepidemic Inflammation of Sublingual Glands in Children; Affection of Unknown Origin. *Am. J. Dis. Child.*, 10:94-98, August 1915.

12. DACOSTA, J. C.: Modern Surgery. Ed. 9. Philadelphia: W. B. Saunders Co., 1925, pp. 903-904.

13. SINGLETON, A. O.: Tumors of Salivary Gland Benign and Locally Malignant. *Surg., Gynec. & Obst.*, 74:569-572, February, 1942.

14. BABCOCK, W. W.: Text Book of Surgery. Ed. 2. Philadelphia: W. B. Saunders Co., 1935, pp. 777.

15. BLAIR, V. P., and OLCH, L. Y.: Practice of Surgery. Edited by Dean Lewis. Hagerstown, Md.: W. F. Prior, Inc., 1942, vol. IV, chap. V, p. 41.

16. JACOBIVICI, PAPOLITZA and ALBU: Sialography. *Presse med.*, 34:1188, September 18, 1926.

17. KIMM, H. T.; SPIES, W. W., and WOLFE, J. J.: Sialography with Particular Reference to Neoplastic Disease. *Am. J. Roentgenol.*, 34:289-296, September 1935.

18. BLADY, J. V., and HOCKER, A. F.: Sialography: Its Technic and Application in Roentgen Study of Neoplasms of Parotid Gland. *Surg., Gynec. & Obst.*, 67:779-788, December 1938.

19. MCFARLAND, J.: Mysterious Mixed Tumors of Salivary Gland. *Surg., Gynec. & Obst.*, 76:23-24, January 1943.

20. DOCKERTY, M. B., and MAYO, G. W.: Primary Malignant Tumors of Submaxillary Gland with Special Reference to Mixed Tumors. *Proc. Staff Meet. Mayo Clinic*, 17:593-603, December 16, 1942.

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COMPOUND COMPOSITE ODONTOMA ASSOCIATED WITH AN IMPACTED MANDIBULAR RIGHT LATERAL INCISOR

BRUCE D. FORSYTH,* D.D.S., Washington, D. C.

THE term odontoma is derived from the Greek words *odons,* a tooth, and *oma,* a tumor. This term was coined by Broca in 1869 and was accepted by the Anatomic Society, meeting in Basle, Switzerland, in 1895.[1]

CLASSIFICATION

Odontomas, benign tumors, are slow growing. Many authorities restrict the use of "odontoma" to hard tumors of the jaw, composed of fully developed enamel, dentin and cementum, either singularly or in combinations. Bland-Sutton[2] includes cysts and cystic masses under odontomas. Some authorities extend the classification to include adamantinomas.

Numerous classifications have been suggested, but the simplest and most practical is believed to be the one offered by Brophy[3]:

A. Enameloma, tumor of the enamel.

B. Dentinoma, tumor of the dentin.

C. Cementoma, tumor of the cementum.

D. Mixed or composite odontoma, tumor of two or more of the above tissues.

Mead[4] includes a further subdivision of mixed odontomas:

1. Compound composite odontoma.

2. Complex composite odontoma.

(a) Geminated composite, two or more fused teeth combined with irregular masses of calcified tooth substance.

(b) Gestant composite, one tooth developed within another.

The compound composite odontoma is an encapsulated tumor containing numerous teeth or tooth rudiments consisting of enamel, dentin and cementum. These teeth may be irregular (enamel pearls) or well formed. The typical odontoma occurs chiefly in young subjects, and invariably in the lower jaw.[5] The third molar and canine areas are the most common sites. This tumor is associated with impacted unerupted, partially impacted and partially erupted teeth. It is slow growing and usually painless, often being discovered during routine roentgenographic examination for foci of infection. Prior to the use of x-rays, it was difficult to diagnose.

ETIOLOGY

The etiology is unknown. Bland-Sutton[6] states that this tumor arises from the enamel organ, the capsule or the papilla or from the entire tooth germ. Others think that it is due to excessive proliferation of the epithelium of tooth germs.[7] Some believe that it arises from the epithelium of the mucous membrane. Buechele[8] believes trauma or some other irritation contributes to its development. It is believed that the starting point is directly associated with the dental follicle, but the conditions initiating the abnormal growth are at present undetermined.

DIAGNOSIS

Without the x-rays, diagnosis is ex-

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tremely difficult. The roentgenogram establishes the size, location and area involved; demonstrates whether there is encroachment upon adjacent normal tooth structure, and gives evidence of the contents.

PROGNOSIS AND TREATMENT

The prognosis is favorable, provided the odontoma is entirely removed. This is a benign tumor, but will recur if removal is not complete.

Fig. 1.—Case in woman aged 25; compound composite odontoma and impacted mandibular right lateral incisor as seen during routine roentgenographic examination of edentulous mandibular right lateral area, October 14, 1941. There were no clinical symptoms.

THE LITERATURE

Numerous cases have been reported in the literature by Bland-Sutton,[2] Sterling V. Mead,[3, 4, 7] K. L. Buechele,[8] Shelmire,[10] Hoge, Jones and Armbrecht,[11] Chalmers J. Lyons,[12] Crecca, Guthrie and Greenspan,[13] Qusem and Centino,[14] Jacobs,[15] J. S. Marshall[16] and W. H. Gullifer.[17]

No case of an odontoma associated with an impacted lower lateral incisor had been reported in the indexed literature at the time data for this paper were gathered. The following case is therefore of particular interest.

REPORT OF CASE

An attractive white woman, aged 25, in general good health, came in September 8, 1941, complaining of a toothache in the left upper second molar area. An oral examination was made and recorded. Roentgenograms were available of the upper left second premolar and second molar and of the lower right third molar, having been taken January 9, 1941.

It was noted during the oral examination that the upper right first molar and lower right lateral incisor were missing. There was a history of extraction of the molar, but the patient was certain that the lower right lateral incisor had never been extracted.

Roentgenograms taken October 14 revealed a compound composite odontoma extending up into the space of the missing lower right lateral incisor. The incisor was found to be horizontally impacted, with the coronal portion lying just below the apex of the right cuspid and bicuspid. (Fig. 1.) The crowns of the central incisor and cuspid had converged, so that there was little space remaining between these two teeth. The

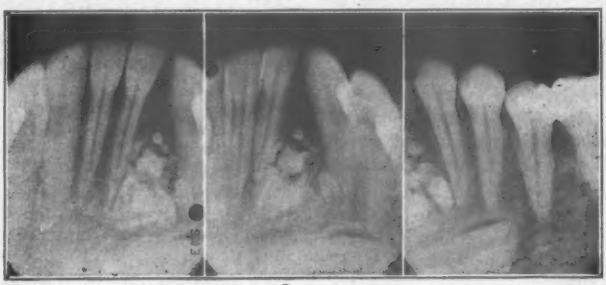

Fig. 2.—Case shown in Figure 1. The films, taken December 11, 1943, showed no noticeable change in more than two years. The clinical picture had remained negative throughout.

patient was informed of the existing condition and of the advisability of complete removal, but was warned that owing to the close proximity to the apex of the adjacent teeth, these teeth might become devitalized after the operation.

Since the patient was completely unaware of the condition prior to her visit, having no clinical symptoms, she was reluctant to consider an operation. It was thought advisable to secure another opinion concerning the case, so the roentgenograms were sent to Mead, Newton and Lynch for their opinion. The following quotations are from a letter received from Dr. Lynch, dated December 1, 1941.

There is no doubt that this odontoma and the impacted tooth should be removed, but the patient should be instructed that their removal might jeopardize the left mandibular central incisor and the right mandibular cuspid and the right mandibular first bicuspid. She would undoubtedly have some paresthesia in the lip following the operation.

The patient was then called in for a consultation, but refused to have the odontoma and impacted tooth removed, her chief arguments being that she had no apparent ill-effects from the condition, and that she would be greatly handicapped, from an esthetic point of view, if she should lose the adjoining central incisor and cuspid. She finally agreed to periodic roentgenographic examination of this area. Films taken on February 7 and June 22, 1942, February 5, May 31 and December 11, 1943 (Fig. 2) showed no noticeable change in this period. The clinical picture has remained unchanged.

BIBLIOGRAPHY

1. SCHULTZ, L. W.: Odontomas: Classification, Diagnosis and Treatment. J.A.D.A., 17: 1874, October 1930.

2. BLAND-SUTTON, J.: Odontomes. *J. Odontol. Soc. Great Britain,* November 18, 1887.

3. MEAD, S. V.: Diseases of Mouth. Ed. 5, St. Louis: C. V. Mosby Co., 1940, p. 924.

4. *Idem:* Oral Surgery. Ed. 2, St. Louis: C. V. Mosby Co., 1940, p. 1112.

5. EWING, JAMES: Neoplastic Diseases. Ed. 4, Philadelphia: W. B. Saunders, 1940, pp. 779-781.

6. BLAND-SUTTON, J.: Tumors Innocent and Malignant. Their Clinical Characters and Appropriate Treatment. London: Cassell & Co., Ltd., 1917.

7. MEAD, S. V.: Diseases of Mouth. Ed. 1, St. Louis: C. V. Mosby Co., 1927, p. 455.

8. BUECHELE, K. L.: Composite Odontoma. J.A.D.A., 27:1479, September 1940.

9. BLUM, THEODOR: Oral Surgery of Interest to Rhinologist. *Internat. J. Orthodontia,* 17:59, January 1931.

10. SHELMIRE, BEDFORD: Benign Tumors and Cysts of Oral Cavity. *Internat. J. Orthodontia,* 17:273, March 1931.

11. HOGE, A.; JONES, A. L., and ARMBRECHT, E. C.: Composite Odontoma in Presence of Syphilis. *Internat. J. Orthodontia,* 17:597, June 1931.

12. LYONS, C. J.: Dental Neuralgias Which Simulate Tic Douloureux in Character. *Internat. J. Orthodontia,* 17:727, August 1931.

13. CRECCA, J. D.; GUTHRIE, E. H., and GREENSPAN S. N.: Removal of Complex Composite Odontoma. J.A.D.A., 28:118, January 1941.

14. QUSEM, R., and CENTENO, G. R.: Compound Composite Odontoma Containing Seventeen Small Teeth. J.A.D.A., 26:162, January 1939.

15. JACOBS, M. H.: Etiology of Dentigerous Cysts, Multilocular Cysts, Odontomas and Adamantinomas. *Am. J. Orthodontics,* 25: 1190, December 1939.

16. MARSHALL, J. S.: Injuries and Surgical Diseases of Face, Mouth and Jaws. Ed. 3, Philadelphia: S. S. White Dental Mfg. Co., 1902, p. 669.

17. GULLIFER, W. H.: Odontoma. *Am. J. Orthodontics,* 24:795, August 1938.

PRECISION MANDIBULAR IMPRESSION TECHNIC

Rae D. Pitton,* D.D.S., Bethesda, Md.

THE prosthetist can render his fellowman a great service, in spite of the difficulties which he must overcome. We are all familiar with the many technics advocated by members of our profession emphasizing short cuts and easy methods of fabricating maxillary and mandibular dentures.

I have come to the conclusion that there are no short cuts in denture construction. Technics have become progressively more scientific, producing a more satisfactory functional prosthetic restoration. In full denture construction, the tissues of the mouth must be fully covered in order to obtain maximum retention, stability and comfort for the patient. This is accomplished by extending the impressions to the biologic limits of the muscles and membranes involved. For instance, the palatoglossus muscles, and the membranes anteriorly from these muscles, determine the farthest border of the lingual flanges of the completed mandibular denture. The protrusion of the tongue puts this muscle into action and trims the impression in this area.

Specially prepared trays are necessary for impression taking, because the ordinary stock tray does not allow for free muscular movement. The lingual surfaces of the mandibular impression are trimmed first because, during mastication, the greatest force is directed toward the lingual surface. Likewise, in trimming the buccal and labial surfaces of the mandibular impression, the force is directed toward the lingual surface.

The mylohyoid muscle is raised when the patient puts his tongue in the cheek on the opposite side to be trimmed. This movement of the tongue trims the impression in this area. When molded in the mouth, compound is pulled away from the area where it has been trimmed. Therefore, by placing the tongue against the cheek of the opposite side, and then bringing it back to the side being trimmed, the material is again brought in contact with the mucous membrane.

Black impression compound is used in the impression tray, because its high fusing point does not allow distortion so readily. It is shaped over the ridge area by using the index finger, making sure that the lingual flange areas have sufficient bulk of impression material. The compound is flamed in order to glaze its surface and then tempered in water at 140 to 145° F. This temperature will not burn or injure the tissues of the mouth. At this time, pressure is used against the tray in the bicuspid area only. The index fingers are placed on the top of the tray at each side, and the thumbs against the lower border of the body of the mandible. The impression is chilled before removal from the mouth.

The impression is now cut down to the point where it is underextended, allowing for additional compound to be added to the periphery. The impression is put back in the mouth to test for any overextension of the periphery. The patient now protrudes the tongue, afterwards placing it as far back in the mouth as possible, and repeats rolling the tongue first to the right cheek and then to the left. These movements indicate whether the impression is overextended.

Read before the Detroit (Mich.) District Dental Society, February 10, 1944.

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The buccal and labial tissues are also flexed, to determine any overextension in this area.

Low fusing compound is now added to the lingual flange of the impression. In trimming the lingual surface, the heated portion is placed in the mouth first to prevent interference by the tongue. The compound is glazed with an alcohol torch, tempered in water and placed in the mouth. The patient protrudes his tongue in order to trim the palatoglossus area, and then presses the tongue on the opposite cheek. The mylohyoid muscle is raised, and the impression material contacts the surface of the mucous membrane on the opposite side. By going through these movements of

Postdamming of impression in heel and in lingual area, completing sealing of lower impression.

the tongue, the patient trims the palatoglossus and mylohyoid attachments on the internal surface of the mandible, thereby determining the periphery in this area.

The buccal periphery of the impression is determined by folding the buccal tissues over the top of the impression with the first two fingers and depressing these tissues toward the midline of the mouth. The impression is held in position with pressure in the bicuspid area and chilled before removal. In trimming the buccal surface, the heated portion is placed in the mouth last. Compound is then added on the periphery of the labial area and placed in the mouth last. The patient is asked to raise his lower lip, but if this is not done to the operator's satisfaction, the lip is raised and depressed over the top of the impression by the operator's thumbs. The impression is held down in the bicuspid area with the other fingers, and chilled.

The next important step in the completion of a satisfactory impression is in the area where the buccinator muscle deflects into the area of its insertion in the pterygomandibular ligament. The impression in this area can be obtained accurately only when it is trimmed under pressure.

This area is again flamed, tempered and placed in the mouth last. Two fingers are placed over the top of the ridge of the impression on the side that we wish to trim, and the patient is instructed to bite down. At the same time, the impression must be held in position on the opposite side. The attachments of the muscles in this area will be additionally trimmed because the patient closed on the fingers. This is the force that will be exerted in the completed denture, or that force which will be brought about under biting stress.

The pterygomandibular ligaments determine the posterior border of the completed denture. Compound is applied from the buccal to the lingual flange area; that is, from the buccal portion, to the heel, to the lingual flange of the impression. This area is again glazed, tempered and placed in the mouth first. At this time, the patient protrudes the tongue and then places it in the opposite cheek, thereby trimming the palatoglossus area, if necessary, and forcing the compound into contact with the tissues. The patient closes and then opens his mouth, thus again trimming the posterior border of the impression, by flexing the pterygomandibular ligaments. The same procedure is repeated in detail on the

opposite side. This procedure is essential for the retention and stability of the completed denture. At the same time, this closes the space under the lingual flange area, making it impossible for any form of food débris to seep under the denture at this point.

Up to this time, there is probably little, if any, retention of the impression. The lingual frenum and geniohyoid muscle attachments are trimmed by the patient protruding the tongue and then placing it back in the roof of the mouth. He then turns the tongue from side to side, which will force the material against the surface of the mucous membrane, creating the seal or postdam. The postdamming of the impression in the heel and in the lingual area completes the sealing of the lower impression. These three vital points of a mandibular impression must be accurately obtained in order to achieve a perfect sealing of the impression in the mouth.

The impression is now ready to be tested for retention, stability and comfort. Any overextension is determined by having the patient repeat all the exercises previously described. The palatoglossus area is tested by having the patient protrude the tongue. The mylohyoid area is tested by his placing the tongue in the opposite cheek. The pterygomandibular ligaments are tested by opening the mouth widely, and the lingual frenum and geniohyoid areas by protrusion of the tongue and by then placing it back in the roof of the mouth. The buccal and labial flange areas of the impression are then checked by having the patient smile.

A wash is made by placing any suitable material for this purpose in the impression. It is then put in the mouth and held firmly in position in the bicuspid area as before, and the patient again goes through all the previous movements of the tongue and of the buccal and labial tissues. After the impression is removed from the mouth, there are likely to be feather edges present on the lingual flanges, which must be removed. This excess material, which has been squeezed between the tongue and the mucous membrane in the lingual flange area, would not be tolerated by the mucous membrane in the completed denture.

A thorough knowledge of the action of the muscles of mastication and expression is of great value in considering their physiologic function and peripheral origin and insertion. The muscle calisthenics that I have suggested here are of absolute necessity if the impression is to record the extent of muscle function. When completed by this method, the impression possesses the same stability that the completed denture will have when it is processed. Any defect the impression may have can therefore be corrected before the next step in construction. If these imperfections are not remedied, we can expect the finished restoration to copy these same discrepancies.

Success in full denture restoration may therefore be considered to be, in a large measure, due to the degree of skill and care exercised with each particular phase of the technic. This does not necessarily involve additional time; for if we learn to do each step correctly and completely, rapidity of operation comes with practice. If additional time is involved in the beginning, it is more than compensated for by time saved later, in trying to adjust the improperly constructed denture to the patient's mouth. The personal satisfaction that the operator obtains in producing the finest and fullest prosthetic service is reflected in the prosthesis of the patient, who has achieved a maximum functional and esthetic restoration, together with normal speech and diction.

Note.—The opinions or assertions contained herein are the private ones of the writer and are not to be construed as official or reflecting the views of the Navy Department, or the Naval Service at large.—Article 113 (2) U. S. Navy Regulations.

SCHOOL FOR DENTAL TECHNICIANS (GENERAL), U. S. NAVAL TRAINING STATION, SAMPSON, N. Y.

A. P. S. Sweet,* D.D.S.; M. F. Draye,† D.M.D., and R. W. Hornbaker,‡ D.M.D.

DURING the latter part of January 1943, orders were received by the senior dental officer to establish a school for dental technicians (general). By his direction, the senior assistant dental officer, January 28, appointed a dental school officer. Much of the success of the school is due to the executive ability of this dental officer and the advice and assistance that he received from his superior officers. The first class of fifty reported January 30, 1943, all being hospital apprentices second class. Lectures started February 1.

Within this short interval, Thursday to Monday, a classroom and office were secured, furniture was obtained, a faculty was selected and the curriculum was planned in accordance with the material published in "A Handbook for Dental Technicians, General." This book was supplied by the Naval Dental School, National Naval Medical Center, Bethesda, Md., where it had been prepared by direction of the commanding officer.

Two classes were graduated before the dental school officer was ordered to other duties. He was relieved by the present incumbent June 14, 1943. During October, while Class IV was still in session, it was decided that two classes could be instructed simultaneously and Class V reported November 6, 1943. Since then, this stagger system has been in effect, enabling the school to graduate a class every five weeks.

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PHYSICAL ASPECTS OF SCHOOL

The physical properties of the school consisted originally of an office and classroom equipped with desks and writing-chairs, blackboards, a screen and a balopticon projector. As the school has grown, a larger classroom (Fig. 1) has been provided and the office space has been doubled. Considerable educational material has also been acquired, and as rapidly as possible.

The foundation of this material is, of course, the textbook mentioned in the first paragraph. This has been augmented by movies, photographs for the balopticon, slides and anatomic paintings, both for the balopticon and for mounting above the blackboard. (Fig. 1.) Of late, a modest library has been added, consisting of several hundred copies of dental magazines, various textbooks and ten copies each of three standard textbooks for dental assistants. The latest addition is a package library containing eighty-eight folders on various dental subjects. In preparation is an abstract library that will be brought up to date in the near future. Both the library and the package library are available, not only to the dental students, but also to the dental officers on the station.

CURRICULUM

The curriculum consists of a series of

lectures on anatomy, bacteriology, dental charting, dental technology, histology, materia medica, odontography, oral hygiene, ordering supplies, pathology and radiodontics. Subject material in these various courses is streamlined to a considerable degree so that the students can obtain a working knowledge of these subjects during the seven weeks of lectures. It has also been found highly advantageous to furnish each student with a multilithed copy of a lengthy list of questions that cover the minimum knowledge required for each subject and to base all final examinations on these questions.

Fig. 1.—Graduation exercises of Class VI.

FACULTY

At the beginning, the faculty consisted of a lecturer for each subject, who took time from his operative work to deliver his lectures.

A graduate of Class I was assigned to duty at the school and has served as school secretary since that time. A graduate of Class III, a teacher in civilian life, was assigned to duty at the school to teach dental charting and also act as a permanent master at arms for all classes. These two men have served with more than ordinary zeal and efficiency. It was, in fact, at their suggestion that the night classes, which they conduct at a sacrifice since they otherwise would be at liberty to go ashore, were instituted.

After graduating four classes, it was considered advantageous to limit the size of the faculty to fewer dental officers who could spend their full time in teaching and, in this manner, prevent waste of chair hours, as had occurred previously.

The present faculty consists of the dental school officer and two other dental

officers and the above-mentioned pharmacist mates. In addition, a pharmacist gives two lectures on ordering supplies.

STUDENT BODY

Students are ordered to the school by the Bureau of Medicine and Surgery in groups of varying sizes or singly by name. They are for the most part hospital apprentices second class, with a few hospital apprentices first class and an occasional pharmacist mate third class. Their civilian background is varied and interesting. Some have not had the benefit of even a grammar school education, while fourteen are college graduates. (Table 1.) The number and variety of civilian occupations represented in the various classes has been remarkable. (Table 2.) Some are, of course, direct from high school, having thus had no business training, while others have had extensive business or professional experience.

The first five classes were composed entirely of male personnel, but, since then, classes have been coeducational with a number of WAVES in evidence. It is considered not improbable that future classes may consist entirely of WAVES.

INSTRUCTION

Instruction is both didactic and clinical, more than half the students' time being spent at the latter. Didactic instruction consists of lectures with quizzes and final examinations augmented by all possible visual aids. These consist of paintings, still and movie projection, plaster teeth and a large wooden molar tooth (2 feet high) that opens in both cross and longitudinal sections. The anatomic paintings and the wooden tooth

Fig. 2.—Class picture of Class VI.

were prepared by the audio-visual-aid department.

In recently graduated classes, a schedule has been worked out so that the students receive instruction in only three, or at the most four, subjects at a time, completing these subjects (including final examinations) before taking up the study of the next group of subjects. This has been found highly advantageous for two reasons. In the first place, the new students are laymen and as such are immediately confronted with a nomenclature and mass of technical knowledge with which they are entirely unfamiliar. Since they now have fewer subjects at the beginning of the course, their confusion is not so great and better results are obtained from the very start. A glossary of terms for each subject is now in preparation, and it is expected that this will help still more to solve their difficulty. In the second place, as soon as the original group of subjects is finished, the faculty has a much better opportunity to quickly uncover the drones and trouble makers of each class, of which there are bound to be a few. These are dropped from the class as soon as they have proved themselves to be undesirable members. This undoubtedly accounts to some extent for the excellent class averages. Scholarship alone will not guarantee graduation, for any student who shows definite signs of inaptitude or an improper attitude is dropped from the roster.

TABLE 1.—DATA ON STUDENTS

Class Number	Number Reported	Average Education in Years and Months	Advanced in Rate			Detached					Scholastic Attainment		Graduated
			HA 2/c to HA 1/c	HA 1/c to PhM 3/c	To V-Programs	Scholastic Failure	Inaptitude	Bad Conduct Discharge	Held Over (Illness)	To V-Programs	Over 95%	Class Average	
1	50	12–1	42	0	1*	3	0	0	1	0	10	89.2	46
2	51	12–7	1	0	1*	6	1	0	0	0	16	92.6	44
3	53	12–3	0	0	1*	2	0	1	0	0	7	88.9	50
4	53	12–5	4	2	2	3	0	1	0	2	8	89.4	47
5	26	12–0	3	1	0	2	1	0	1	0	5	90.7	22
6	31	12–6	19	0	3*	2	0	0	1	0	7	90.5	28
7	31	11–6	5	0	0	4	0	0	2	0	2	87.4	25

*The difference between these figures and those in column "To V-Program" under "Detached" is due to the fact that those recommended for the V-Program during the school term were not accepted until after graduation.

Students are encouraged to strive for advancement in rate. This is not very difficult for advancement from hospital apprentice second class to hospital apprentice first class, but, from this point, owing to the increased requirements to be met, it is much more difficult. Both the former dental school officer and the present incumbent have considered it their duty to recommend qualified students for the V-Program and are pleased that eight have made it, two to V-7 and six to V-12.

TABLE 2.—CIVILIAN OCCUPATIONS OF STUDENTS

Accountant	2	Licensed masseur	1
Aircraft plant worker	3	Liquor store owner	1
Ambulance driver	3	Loan supervisor	1
Assistant manager	3	Machine gun inspector	3
Assistant paymaster	1	Machinist	13
Auto mechanic	4	Mechanic	4
Bank teller	1	Meter reader	1
Bookkeeper	7	Movie operator	1
Bridge officer	1	Musician	5
Butcher	1	Newsboy	1
Buyer, clothing	1	Newspaper worker	1
Cashier, department store	1	Optometrist	1
Chain parking lot owner	1	Paper hanger and painter	2
Chauffeur	1	Pharmacist, registered	5
Chemical worker	9	Photographer	1
Chiropodist	1	Plastics worker	1
Chiropractor and physiotherapist	1	Pool room operator	1
Church sexton	1	Post office worker	1
Claim man and investigator	1	Poultry disease specialist	1
Clerk, advertising	1	Printer	2
Clerk, drug	16	Professional golfer	1
Clerk, hardware	1	Radio announcer	1
Clerk, mail	1	Radio entertainer	1
Clerk, non-classified	42	Radio tube worker	1
Clerk, shipping	4	Railroad worker	2
Clerk, store	5	Riveter	2
Coal miner	3	Salesman, non-classified	12
Construction work	5	Salesman, insurance	1
Customs inspector	1	School teacher	5
Defense work	2	Service station operator	1
Dental prosthetic technician	15	Ship fitter	1
Dental technician	6	Shipyard worker	3
Designer, art work	2	Shoe store manager	1
Draftsman	6	Shoemaker	1
Electrician	1	Steel mill worker	1
Electroplater	2	Stenographer	1
Elevator starter	1	Storekeeper	3
Exterminator	1	Store manager	2
Factory worker	4	Timekeeper	3
Farmer	6	Tailor	2
Fireman	1	Taxidermist	1
Gas shovel operator	1	Tractor driver	1
Hatchery worker	1	Traffic manager	1
Hospital orderly	17	Truck driver	8
Hotel manager	1	Undertaker	10
Hotel steward	1	Welder	3
Inexperienced	49	Well driller	1
Instructor in industrial plant	3	Wholesaler	1
Laboratory work	1	Wood plant foreman	1

NIGHT SCHOOL

An interesting innovation is the night school, which is open to those who find it difficult to keep up with their studies and who require special tutoring. We believe that it has an important bearing in securing high grades and in lowering the number of failures.

Before night classes were conducted, failure in a subject was punished by restricting the student's liberty in an effort to make him spend more time at his

studies. This was resented to a certain extent and was not entirely satisfactory. Now students are ordered to night school for additional work when they fail and usually are later able to pass make-up examinations. This has resulted in an improvement in student morale, as well as in scholastic attainments.

CLINICAL INSTRUCTION

In a recruit camp, there is a wealth of clinical material available and this is used to the best advantage in student training. Upon reporting to the school, two members of the faculty divide the class into small groups and, in an actual operating room with standard equipment, instruct them in the fundamental duties of a dental technician. A group, as soon as it is considered ready, is assigned to the senior dental officer of a recruit training area, who assigns the students to assist dental officers at the chair. These assignments are rotated every week so that the students obtain a wealth of experience by assisting different dental officers. All male students are assigned for one week to the senior dental officer of the receiving unit, from whom they obtain valuable experience in dental charting. This assignment is, of course, not available to WAVE personnel.

SCHOOL GOVERNMENT

School government is in line with military procedure. In charge of each class and responsible for their discipline is the master at arms previously mentioned. His first lecture to each class informs them as to all school regulations, procedures and privileges. He also gives them the textbook and an envelope that contains advertising literature of reputable manufacturers on amalgam, cement and x-ray film and a booklet giving in detail the school rules and regulations. To this material has been added a booklet on dental charting prepared by the faculty.

In addition, two section leaders are appointed in each class, one from the male members and the other a WAVE, who march their sections to and from classes in a military manner.

Any student wishing to request a privilege or who feels that he has a just grievance first takes this up with the master at arms, who attends to the difficulty or grants him permission to see the school executive officer. He, in turn, when the necessity arises, gives permission to see the dental school officer. No student is ever refused the right to see the latter, if he wishes to do so. All class assignments, orders, etc., are read to the class and posted on both the school bulletin board and in the barracks.

GRADUATION

After completing their ten weeks of school, graduation exercises are held in the classroom. These are attended by an official party usually consisting of the senior dental officer, the senior assistant dental officer, the faculty, staff and guests of the students. Multilithed programs are prepared for the occasion. Immediately after graduation, both watches are given liberty for the week-end. At the graduation exercises, there is usually a short speech by a guest dental officer before the certificates are presented by the senior dental officer. (Fig. 1.) Prior to graduation, a class picture (Fig. 2.) is taken and information gathered about each student, which is sent to his home town newspaper. It has lately been the custom for the public relations department to publish in the *Sampson News* a picture of the honor man receiving his certificate from the senior dental officer.

ORDERS

Orders to their new duties are received from the Bureau of Medicine and Surgery for each dental technician graduate. Thus, they stay at Sampson or leave as the case may be and join the ranks of those who are assisting our dental officers in their work in the Navy.

ADVANCED THOUGHT IN INDIRECT INLAY AND FIXED BRIDGE FABRICATION

PART III—INDIRECT INLAY IMPRESSION TECHNIC

(Continued from pages 913-924, July 1, 1944)

E. S. Smyd, D.D.S., B.S.D., Detroit, Mich.

Inherent in the problem of cavity design is always the problem of cavity registration by an impression. Great difficulty was encountered heretofore in obtaining an accurate impression, not only of the complex cavities, but even of the simple ones as well. Much resistance and retention was sacrificed because of the difficulty of obtaining an accurate copy of the prepared tooth. The "welded" indirect inlay impression has contributed as greatly to dispel the discouragement of this phase of our work as has the introduction of electroforming.

A welded impression is one obtained by fusing together small amounts of impression compound under heat and pressure into a form which confines the prepared cavity. The impression is progressively built up from the cervical aspect to include all of the prepared cavity and some of the adjacent unprepared crown of the tooth. The procedure is similar to placing an amalgam filling. It is very rapid, seldom taking more than a few minutes once the retaining band is formed and applied, and preparations are completed. This method of impression taking is a distinct improvement over the methods formerly in use in that the temperatures of the softened compound are never excessive, as they might easily be when dry heat is employed to soften the impression material. Later, an exposition of the method will be undertaken. It would be apropos to say here something about the historic problems that led up to the present development of the technic.

The compound used for the impression is confined in a band of copper or brass today just as it has been in the past. The present method, however, makes possible a much more precise trimming of the band than that which was possible formerly. Since manipulation subsequent to the trimming of the band does not alter its prescribed position, easy retraction of the completed impression is a foregone conclusion. In the past, perhaps nothing has been more discouraging to a conscientious operator than to discover, after expending much time and care in the proper festooning and trimming of a band for the impression, that, in completing his impression, the band was forced down apically on the tooth. It is inevitable that, even though such an impression may look all right, the resulting casting will be grossly inaccurate. Another source of great irritation was the opposite eventuality. When too much compound was included in the band (the exact amount was always hard to gage because the passage of the tooth into the band displaced compound, and this had the effect of overfilling the band), pressure applied to the compound would actually cause the band to float up on the mass, and the resulting impression would fail to reach the margins. Not the least troublesome was the frequent spreading of the festooned proximal flanges of the band.

Various devices for preventing apical

movement of a band in impression-taking have been tried. Bending the edges of the band over the adjacent teeth or over an unprepared surface of the crown of the tooth is an aid. Spreading an undersized band to correct dimension and using the shoulder so formed to stop the band against the uncut crown of the tooth has also been used. The fault with the latter is that expanding the band work-hardens it. When such a band is pressed to place on a tooth, its elastic form is strained. During its removal with the impression in it, it is strained more. When completely removed, it tends to resume a passive form and the impression is distorted. If a work-hardened band is annealed, it is too weak to make the activated compound conform to the cavity walls, because its gage has been reduced by the stretching process.

The most satisfactory method of confining impression material consists of using an inner tube of copper or brass, which must fit the tooth snugly, and have some stiffness, but should be passive, and placing over this an outer or "encasing" tube of variable dimension. A device such as an amalgam matrix former serves admirably as an outer band. After the impression has been chilled, the matrix holder and outer band can be easily and quickly removed, exuded compound flicked off and the inner tube with the included impression easily removed. The inner band may be festooned and trimmed as freely as the case may require, but when it is backed up by the outer tube, one

Fig. 12.—Prepared cavities.

Fig. 13.—Festooning of copper band.

Fig. 14.—Preliminary or marginal impression.

Fig. 15.—Trimmed preliminary impression with "encasing" band in position.

can put any amount of packing pressure within reason upon the welding compound without causing appreciable cervical spread.

The method of taking accurate indirect inlay impressions to be described here is equally facile for complex and for simple cavity preparations. The facility with which this method makes possible the management of difficult cases can hardly be overstated. It makes possible an intimacy of contact between the casting and the tooth heretofore impossible by the indirect system. So accurate are the impressions that the utilization of resistance and retention to the fullest becomes possible, by means of butt joints and dowels, even without the necessity of recourse to a burnishing bevel. This may not be a recommendable routine procedure, but it is a fact. It may be possible to obtain greater precision, but, within the limits of practicality, we have here an implement which should have great humanitarian significance.

The description will cover the procedure for securing an impression of a complex cavity such as the mesioclusodistal or the three-quarter crown, as these have always been the most difficult impressions to secure. For securing impressions of a mesioclusal, a distoclusal or a complete gold or porcelain jacket, the outer supporting tube may be dispensed with, as the festooning of the copper tube is not usually of such gravity as to require bulwarking greater than that afforded by a small interdental wedge of wood. This description will go along with certain photographs of a practical case under my care while I was writing this treatise. (Fig. 12.)

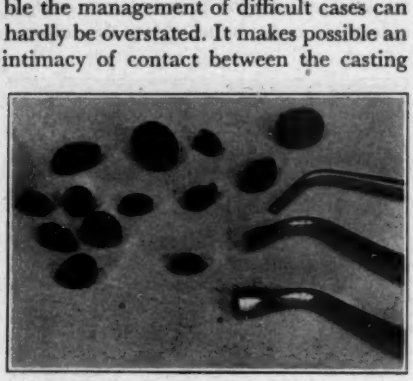

Fig. 16.—Close-up of amalgam pluggers and pledgets of impression compound.

Fig. 17.—Welding pledget of compound to previously molded mass.

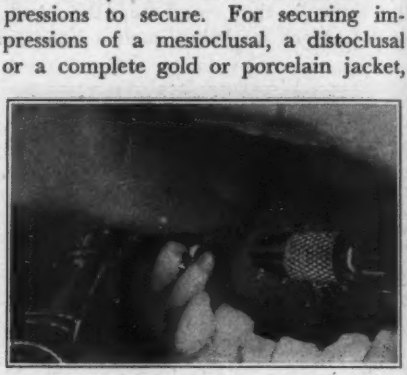

Fig. 18.—Finger pressure, maintained on molded compound until thoroughly chilled.

Fig. 19.—Small spoons used to dislodge impression by axial traction.

The proper size of copper band is selected, one end of it festooned so that the band will just cover the cavity. (Fig. 13.) A very little low-fusing compound (tracing sticks) is luted to the edges of the band which encounter the most remote part of the preparation, and the band is easily pushed to place on the tooth. Since no compression of compound takes place at this stage of the procedure, the band will easily pass between the gum tissue and the prepared tooth, and spreading of the band will be a negligible quantity. This preliminary or marginal impression of the prepared cavity is chilled and removed. (Fig. 14.) All of the band which engages the anatomic undercut is trimmed off, but enough is left to delineate the margins of the preparation. When, for esthetic reasons, considerable bell of the tooth is left intact, the band is trimmed exactly to the margin. Otherwise, easy removal of the impression is unlikely and distortion is inevitable unless the cavity is a simple mesioclusal or distoclusal one without dowel grooves.

Let us consider these two-surfaced cavities for a few moments. It is never advisable to retrieve an impression molded into an undercut; but the fact that a microscopically thin layer of saliva or water separates the impression from the tooth enables the operator to employ a little tipping movement to dislodge these impressions. Since the cervical margin marks the most distant line from the point of fulcrumage employed in the tipping, a little movement at the

Fig. 20.—Completed distoclusal impression of first bicuspid employing interdental wedge.

Fig. 21.—Chilling mesioclusal impression of second bicuspid employing interdental wedge.

Fig. 22.—Dislodging mesioclusal impression of second molar.

Fig. 23.—Wax bite taken of prepared cavities.

site of the latter makes possible a trigonometrically increased movement at the cervical margin. Consequently, rotational retraction which carries the cervical margin away from the tooth can be accomplished without violating the limits of tolerance between the dovetail and its cavity walls. It is because this set of circumstances obtains that accurate impressions of bell-crowned preparations can be achieved. A measure as to the degree of accuracy of such impressions can be had by the statement that inlays made and polished on dies from the fore-

Fig. 24.—Low-fusing metal poured into electroformed impressions.

Fig. 25.—Waxing dies into position in "bite."

going impressions can be cemented without burnishing and show no cement line.

To continue with the impression technic: The band is trimmed as liberally as the case requires. If a complete registration can be traced of all remote margins of the prepared cavity, all of the band in excess of one-eighth inch above the crown of the tooth is trimmed off. The preliminary impression is replaced and the outer band with its matrix holder is placed around the inner tube. (Fig. 15.) The flow of the compound in the band is started with water just warm enough to keep the compound at the printing state, and the mass of compound is packed in the tube apically toward all cervical margins. (Fig. 16.) While the assistant irrigates the compound in the tube, small quantities of cold compound are added to the mass in

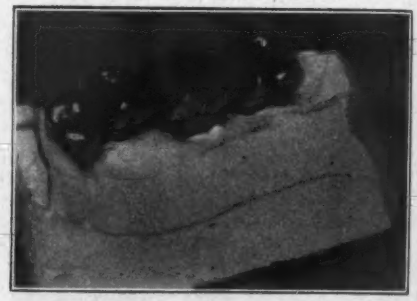

Fig. 26.—"Bite" mounted on articulator. The inlay patterns are waxed and carved to occlusion and form.

Fig. 27.—Castings with respective dies placed in position.

the tube with cotton pliers and are packed into the cavity with amalgam pluggers. (Fig. 17.) Each increment will weld perfectly with its predecessor under heat and pressure. It may be feared that water will be incorporated in the mass, but quite the contrary. Whereas plunging a whole mass of softened compound

over the prepared tooth is almost certain to trap saliva and air between it and the tooth, the progressive welding or packing of impression material excludes all traces of saliva or gas. Water and presumably saliva are virtually incompressible and, if they are trapped between the compound and the tooth, no amount of human force can bring the two together.

One of the most inglorious monuments to an operator's diligence was the "tube" impression with its well-rounded counterparts for square-cut shoulders. The impression may now be very disappointing, but it will not be for want of detail. When the cavity is completely filled, a cold pellet of compound is placed in the softened mass and pressure is brought to bear upon it with the amalgam plugger. (Fig. 18.) This will closely adapt the compound laterally against the cavity walls. The remaining one-eighth inch of the band is filled and a finger is placed over the end of the band; and while the assistant continues to irrigate the impression with the warm water, pressure is exerted against the compound until it begins to exude at some visible point (Fig. 19), when it is chilled thoroughly. The matrix holder and outer band are removed. All compound that exuded beyond the copper band, particularly that under the bell of the tooth, flicks away. The impression is not removed by grasping the solid or butt end. The buccal and lingual cervical borders of the band are engaged with the index finger nail of each hand. If the band is under the gum and these edges are inaccessible to the finger nail, two small spoons are used to engage the band beneath the gum tissue. (Fig. 20.) The impression is gently dislodged by axial traction. The band is not guided on its way out, but is allowed to come away freely. If the impression is locked and becomes dislodged with difficulty, it must be replaced and corrected for marginal accuracy.

Fig. 28.—Inlays adjusted to proper contact, occlusion and contour. They are then abrased, but not polished, at this stage.

Fig. 29.—Abrased inlays replaced on dies and polished on bench lathe.

Fig. 30.—Completed case.

Failure to secure an easily dislodged, accurate impression at this time is usually the result of improper festooning of the band. The overextended compound should be trimmed away and the band trimmed to proper length, and impression tube and supporting matrix band should be replaced on the tooth.

The flow of the impression compound in the tube is started with warm water and the compound is carefully re-pressed. Heating is not prolonged and excessive flow is avoided after chilling. The impression can usually be removed with little difficulty. Minor inaccuracies, such as failure to adapt compound to a difficult area on the occlusal aspect, can be corrected by cutting a hole through the solid butt reservoir to the occlusal inaccurate area. The impression is replaced and the compound reheated and readapted to the surface with pluggers and finger pressure.

Figures 21, 22, and 23 show stages in impression-taking of the three adjoining teeth. As the bicuspid preparations were two-surfaced, an interdental wedge of wood was used instead of the encasing tube. Where lingual retraction of the impression becomes necessary, as in the anterior teeth, I usually dispense with the inner tube and weld the compound directly into the matrix band. After the impression is chilled, the matrix holder and band should be removed, and the compound which laps the labial surface should be chipped or carved carefully away. The impression can then be easily removed. Figure 24 shows the taking of a bite.

The impression having been taken, the cavity recording is painted with a thin coat of colloidal carbon or bronzing powder and electroplated according to the usual procedure. Figures 25, 26, and 27 show, respectively, the pouring of a butt or handle into the electroformed impressions, waxing the dies into the bite and the bite mounted on an articulator with the inlays waxed and in position. Glycopan works very well as a lubricant for the dies. Soft plastic wax is melted and adapted under finger pressure to the cavity walls. Hard inlay wax is permitted to flow over this bed of plastic wax. The inlays are carved to anatomic, contact form and occlusion. The sprues are fastened at one of the marginal ridges. Large reservoirs thickened heavily at the point of attachment to the pattern are used. Investment and casting follow. (Figs. 28, 29 [unpolished], 30 [completed].)

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THE MEDICODENTAL RELATIONSHIP*

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THE purpose of this essay is to focus attention upon the necessity and the duty of facing resolutely the fact that the healthy functioning of the human organism depends on the effective care of all its parts, and to urge such a correlation of the ideals, policies and professional activities of Medicine and Dentistry as will promote to the highest degree the well-being for both medical and dental patients. There is abundant reason for the ever-growing conviction that the public interest and welfare demand a more practical and intimate cooperation between the two professions, and that individual practitioners cannot fail to benefit by a cordial interchange of ideas and observations.

The first requisite is a clarification of the doctrine of the medicodental relationship and a consideration of the principles upon which it should rest. The application of these principles may then be worked out according to the individual genius of each practitioner, organization or institution concerned, so that original ideas and natural tendencies may have full play and be in no way impeded. But it is vitally important that doctrine, ideas and tendencies should acquire motive power—and that without further delay.

Knowing what we assuredly do know about the importance and usefulness of the united services of Medicine and Dentistry, their unalterable responsibility for the maintenance of complete health, their manifest duty in regard to the promotion of cooperative research and broader, more comprehensive teaching, and comparing with this the little that we have actually done to develop a consistent, progressive and truly generous program of national scope both in professional education and in practice, must we not truthfully accuse ourselves of backwardness and indecision? Each of the professions has made steady and commendable progress in its own field, but has neglected to reach out for the broader opportunity and the higher attainments which the spirit of our times is constantly urging upon us all. To remain hesitant, primitive, apathetic, uninspired, to be without an effective plan in the face of opportunities so apparent and responsibilities so inescapable seems almost to forswear citizenship in a nation whose pride of achievement is surpassed only by its generosity in lending and sharing what it has achieved.

But no one can deny that a strange inertia does exist. No matter how obvious it is that the two professions can at any moment enter upon an era of far greater usefulness and reward by an active interchange of knowledge and resources, the practical realization of this professional brotherhood is yet to come. The potential reciprocal value of the medicodental relationship never has held and does not now occupy any conspicuous place in the mind or the conscience of either profession. Why must the individual genius, the cumulative knowledge, energy and experience, the organized

*Written upon the invitation of the Council on Therapeutics of the American Dental Association and addressed especially to those men of sympathetic understanding who direct the conscience and shape the ideals of American Medicine and American Dentistry, to the end that they may be convinced, and may act upon the conviction, that an effective medicodental relationship should logically become one of the major influences in promoting and maintaining the public health.

power and influence which have accrued to both professions be still confined to separate channels, when one strong current would carry them both forward to regions of broader vision and finer achievement for each profession? What can be done now to release this magnificent power? Would it be rash to assume that the faculties of our medical and dental schools, the officers and trustees of our universities, the medical and dental staffs in our hospitals, are not rigidly indifferent to well-reasoned plans for improved service? Or that more favorable economic conditions, if no others, may dispel the apathy in each of these groups? It would seem incredible that any one, in any responsible position, would permit problems of human health to wait for some future enlightenment when the friendly cooperation of two related professions may secure immediate solution. Given the personnel and the necessary freedom of action, the incentive to go ahead should not be lacking.

There is, however, another factor to be reckoned with. Conservatism and inertia are a partial explanation of present conditions, but the attainment of the desired objective will, in some cases, require more, much more than an active interest in medical theory and practice on the part of dentists, and likewise more than an active interest in dental theory and practice on the part of physicians. The most potent influence that we can have in reaching a firm decision is the bond of understanding: not merely an intellectual understanding of what constitutes the elements and essentials of an effective medicodental relationship, and how its mechanism shall be assembled, but that God-given understanding that resides in, and arises from, the human heart. By that divine impulse, professional opinion can be made effective and generous action can be accelerated. Without it, as the present status of the medicodental relationship so clearly indicates, no mere attitude, morale or willingness can be relied upon to give the movement its necessary impetus and direction. Let us then seek that spiritual energy "by which more than by cannons or bayonets victory is won"—an energy not "brewed in test-tubes and embalmed in textbooks."

A moral basis for vigorous action is to be found in the history of dentistry during the past twenty-five years, during which time the progress of dental education has been hailed as nothing short of phenomenal. So wise and experienced an educator as President Eliot of Harvard was moved to say: "I want to congratulate you on the greatly improved standing of the dental profession among the professions. That is one of the most striking changes in public opinion that I have witnessed during my seventy years of observation of educational progress. . . . I do not think I have seen during my seventy years . . . any change so great as that which has taken place in regard to the dental profession, and to the means of training dentists." This change has been of such a character, especially during the last decade, as to remove every vestige of doubt as to dentistry's vigor, competence and sincerity. Well-defined aims and appropriate measures have done away with reactionary influences and fostered a professional spirit which can be counted upon to do its part in transforming the present weakly functioning medicodental relationship into a relationship of steadily growing effectiveness and potentiality. Fossilized judgments and ill-founded criticisms only betray the bias of their sponsors. They should not be permitted to continue to cast any shadow or impose any hindrance upon modern dentistry and its expanding opportunities.

The pity is that prejudice, indifference or mere lack of timely information has so limited public support of Dentistry's projects that wartime America, conducting tests of physical fitness, inevitably found herself to have been without ade-

quate dental health service among rural populations and the poor in the cities. There, as in other spheres, a smoothly functioning medicodental relationship would have demonstrated its inestimable worth to the national health-economy. But the dental profession as a whole has been slow to perceive that we must not only recognize, but also thoroughly publicize the broadening of our scholastic and professional outlook, and the expansion of our ideals of health service. It is not enough that dental students in our universities should be selected for their aptitude, with proved inclination toward scientific studies, altruistic ideals and motives, and fitness to represent our profession as practitioners and as citizens. We must see to it also that both the public and our medical colleagues are well informed that these important qualifications are now being insisted upon. The report by H. H. Horner, secretary of the Council on Dental Education, on "Trends in Dental Education"[1] covering (1) the selection of dental students, (2) university relationships, (3) the transformation of curriculum which these relationships have motivated and (4) the extension of dental service as a matter of public economy should be widely circulated among the medical profession, educational philanthropists and other thoughtful citizens.

The high level of professional service to which dentistry has arisen, on foundations of preprofessional, scientific and clinical education closely analogous to those for Medicine, has prepared Dentistry to receive and to confer the benefits of special knowledge, skill and experience, in a general health program in intimate coordination with Medicine. Having experienced the tireless ambition, the progressive improvement and the inherent strength of our separately organized profession, we believe that Dentistry's continuance as an autonomous natural division of health service is at least not inimical to the public welfare. The recent failure of the expensive and much publicized Harvard Plan of dental-medical education, which so soon confirmed the prediction that it would prove abortive, adds force to the prevalent opinion that attempts to disturb Dentistry's autonomy are unjustified on any ground whatsoever. This view is not only held by dental leaders in education and practice, but also endorsed by many educators outside of dentistry who have been observing the trends, experiments and acknowledged accomplishments of the past quarter-century. The honorable democratic position of the main body of physicians, in this relation, was indicated by the late F. T. Van Buren while associate dean of the Columbia University School of Medicine, when, at an annual meeting of the Association of American Medical Colleges, he expressed these convictions:

> Medicine and medical education have troubles of their own which will not be alleviated by attempting to swallow whole another profession; a profession (dentistry), which, by and large, does not want to be engulfed. And a profession like dentistry, with a hundred-year history, deserves to have its feelings considered. . . . And whatever their future relationship may be, let medicine and dentistry now go forward side by side as friendly collaborators in the estimable undertaking of offering help to those who need it and adding to the happiness of life as much as to the length of its span.[2]

Concentrating on historic ideals, assimilating all worthy influences and suggestions, aiming constantly to attain to the full service equivalent of the best possible oral specialty of medical practice, Dentistry will continue to build upon its broadening foundations and be activated by its own *esprit de corps*. Those who are supporting the theory that dentistry should become a specialty of medical practice are, we believe, overlooking the fact that this plan would constitute a serious threat to Dentistry's standards and distinctiveness as a spe-

cialty in oral health service. With the public welfare assured by a dental autonomy as secure as that of medicine, the two health professions may well vie with each other in developing their independent intensive training and skill. In union, there is strength; in professional autonomy, freedom. The advantages of both may be ours if denistry and medicine meet on their common ground in a generous, comprehensive program of give-and-take. Each being complementary to the other, the logical ideal of the relationship of Medicine and Dentistry will be a cordial and harmonious understanding and cooperation, with the one great aim and purpose of promoting the physical well-being of the whole man. An expanding empire of the mind, an untrammeled opportunity for research and progressive enlightenment, must be the background of our endeavors to understand the human organism as a whole and to maintain its health and effective functioning. If Medicine has the same ideals, spontaneous cooperation may be reasonably expected.

Certainly neither the medical nor the dental profession expects to remain static; but so much suggestion and experimentation has ended in failure that we may well ask ourselves, "How shall we learn to see things as they are? for it is well to see clearly that a thing is possible before we begin to teach ourselves how to make it real." Experiments in dental education are as essential to wholesome progress as they are in any other field of human endeavor, and dentistry will always welcome them, provided they are sane, reasonable and not inconsistent with professional ideals and responsibilities. For example, a profession which works to preserve the tissues of the human body cannot be expected to adopt the methods of the production line or the conveyor system. Neither political, nor social, nor even financial, considerations can be weighed in the balance with the dentist's conscience. Visionary schemes, though comparatively harmless in themselves, are a waste of time and a source of undesirable publicity. Some few that have come and gone served a useful purpose in eliminating impracticable ideas and, though for the time retarding our progress toward the medicodental objective, have perhaps brought the desired relationship somewhat nearer.

Not schemes, but Dentistry's solid accomplishments are what should now be appraised. The time has come to lay the ghost of past inadequacy and banish the ancient specters of skepticism, indifference and apprehension. The renaissance of Dentistry has passed through its various stages and is now as complete as faith, hope and constant endeavor have been able to make it, by unremitting attention to the task of establishing a complete harmony between the basic sciences and the clinical and engineering phases of professional procedures. More than a quarter-century has passed since 1918, when the Dental Educational Council of America made its initial classification of American dental schools and began the elimination of those that were operated for profit for proprietors. In 1926, another searchlight was turned on, when William J. Gies completed his masterly study and survey of dental education for the Carnegie Foundation for the Advancement of Teaching; and, in the light of truth, new aims and principles were shown in high relief, while black shadows of doubt fell harshly upon the crumbling vestiges of the old order. Fidelity to fact and subordination to science were Dentistry's watchwords thenceforth; the seventeen years that have intervened since the Carnegie report have integrated the profession by greatly extending its actual and potential progress and achievement as a body of scientific inquirers and practitioners in dental health care.

This fact, together with the ideal of

ever-broadening opportunity for professional service, has urgently suggested our fellowship and cooperation with medicine. The "focal-infection theory" is itself the focal point of professional collaboration and sharing of responsibility for the nation's health. New plans and programs, progressive advances in scientific education, dental sponsoring of biologic research, have clearly shown the quality of our response to the ensuing challenge. The postwar challenge will be even greater, more powerful, more insistent, for the physical well-being of all citizens has become indeed a national concern that can be neither postponed nor turned aside. If Dentistry and Medicine are not forewarned and well prepared to solve the problems and to perform the labors indicated by public opinion and government, fearful chaos may result, with great danger to the people and detriment to professional ideals and prerogatives.

Willingness and spontaneity in cooperation, in the public interest, require something of form and direction to give them effect. Many waves of enthusiasm and gestures of accomplishment in regard to the medicodental relationship have spent themselves in vain, because the image of such a relationship was vaguely formed and hazily defined, even while its practical intents and purposes were emerging in firm outline. All the newly accepted responsibilities, the raising of academic standards, the liberation of the dental press, the advancement of dental research—the persistent inquiry into ways and means of promoting steady growth in professional character, opportunities and attainments—were tending toward one natural goal: the correct interpretation and dutiful performance of Dentistry's part in the maintenance of health. In the process of defining Dentistry's part, it was inevitable that Medicine's part, and the unabridged gap between the two, should come up for consideration; in short, that Dentistry's relation to Medicine should become a problem of major importance, both in educational policies and in professional practice. Each portion of this problem has now received intensive study, and a considerable body of material has been accumulated to form the basis for a program of medicodental cooperation. For such a program, Dentistry believes herself to be well prepared. The ideal of an acceptable medicodental relationship needs only interprofessional agreement to make it a living and beneficent reality.

As the younger profession, less restricted by tradition and an age-long prestige, and keenly aware that dentists need larger opportunities for broadening their outlook and extending their usefulness, Dentistry stands ready to do her part by offering, in cooperation with Medicine, the one thing which Medicine has obviously lacked, the full service equivalent of a highly developed specialty of oral medicine, based upon the knowledge, skill and experience accumulated during more than a century of earnest, conscientious professional life and endeavor. We are convinced that an active medicodental relationship, with this as Dentistry's initial contribution, will be both helpful and creditable to each profession, and beneficial to the public whom we serve. We believe that the relationship we propose will be in no way detrimental to Medicine. Dentistry as a health profession has grown by demonstrating its worth. Each new advance has suggested further experiment, a stronger desire to learn what others can teach—a wholesome impulse to work with others wherever our special knowledge, observation and skill may be of use. Having thus developed ambition to solve Dentistry's biologic problems, and to seek all possible enlightenment on those which are common to dentistry and medicine, the next logical step in our national health program is to develop intimate medicodental collaboration—an ideal which has been

evolving since the general acceptance of the focal infection theory, making it imperative that both Dentistry and Medicine adopt new ideas in education and in practice. Dentistry's task of raising standards and adopting new points of view was by far the greater, but the test of essential equality in scholastic achievement and scientific preparation can now be fully met. It may serve a useful purpose to present here a set of principles, drafted by the Research Committee of the American College of Dentists, which the committee considers essential in the development of an effective medicodental relationship.

PRINCIPLES IN THE DEVELOPMENT OF THE MEDICODENTAL RELATIONSHIP

General

1. Dentistry, in service to the patient, should be made fully equivalent to an oral specialty of medical practice.

2. Complete autonomy for each profession is desirable and necessary. For both, there should be independence with interdependence—a true perspective for each and an effective coordination of both in all individual relationships.

3. Intimate cooperation between the dental and medical professions is essential for the promotion of the public welfare.

Educational

1. Universities should give to each division of knowledge and of public service the attention required by its relationships to public welfare.

2. Medical education and dental education have a common foundation in the basic sciences and, in universities, should be so coordinated as to enable each division to meet fully its obligations in the training of professional personnel.

3. Dental students should be given a better medical understanding, and medical students a better dental understanding.

4. Medical and dental students in universities should be admitted and taught under conditions that would afford opportunity for social and scholastic equality.

5. Clear distinction between training for general practice and for further special practice, with adequate provision for graduate work in special practice, teaching and research, is essential for the full development of each profession's health service.

6. Close geographic and intellectual relations of dental and medical schools with hospitals, for teaching, research and service, are essential.

Professional

1. Dentistry's professional opportunities should be equalized, in quality with those of medicine, in educational and scientific advancement, in attention to the health of the patient and in public recognition for successful health service.

2. Conditions should be made favorable everywhere for close collaboration of individual medical and dental practitioners in service for their patients.

3. No general hospital is complete in its health service personnel without adequate dental staffs and dental internships as well as dental instruction for medical students.

4. Systematic plans of management of oral surgical service as an integral part of hospital administration should be put into operation in all general hospitals.

Civic

1. Dentistry, as a part of a complete health service, should be included in all health service centers, to cooperate closely with medicine; and also should be represented in national, state and municipal health commissions.

If the present generations of physicians and dentists are intellectual men who are true to their scientific training, who intend to base their practice upon an understanding of the human organism as a whole, and who accept as their prime objective the maintenance of general health and effectiveness, we are justified

in believing that they must and will cooperate intimately and effectively. The wartime teamwork of America's greatest industries is an example which the health professions should wish to emulate. Medical and dental leaders are experienced and forward-looking men, able to draft a comprehensive health service plan which would combine the ideal with the practical, pay due regard to the independence and interdependence of the two professions and open the way to a medicodental relationship of far-reaching potentialities.

The alternative to voluntary cooperation to these ends might be a national emergency based primarily upon popular impatience with our aloofness and popular distrust of our altruism. We should then have ourselves to blame for the doubtful measures that might be hastily improvised to avert the consequences. On the other hand, a plan matured under fairly normal conditions would offer to young men (and those who are never old) individual stimulus and good comradeship in the endeavors proposed and the associations offered; to others, of settled habit and accustomed routine, freedom to participate according to their judgment of reciprocal needs and responsibilities, and to the entire personnel of each profession, abundant opportunity to contribute whatever they could to the solution of the biologic and economic problems of Dentistry and of Medicine in the public service.

To avoid further delay in submitting a definite proposal for direct action on the medicodental relationship, it is suggested that a carefully chosen commission be organized to survey the problem and resolve its complexities, and that this commission be composed of nine members and a full-time secretary, as follows: the secretaries of the Councils on Education of the American Medical Association and of the American Dental Association; one representative each from the Association of American Medical Colleges, the American Association of Dental Schools, the International Association for Dental Research, the Federation of American Societies for Experimental Biology and the Association of American Universities, a practicing physician and a practicing dentist. The salary of the above-mentioned secretary, with all other expenses, should be shared equally by the American Medical Association and the American Dental Association. All available information, suggestions and tabulated materials would be considered by this commission, which would announce its conclusions only after a thorough and impartial canvass of related medical and dental opinions.

The commission's final judgments would have official weight, and should command the support of medicine, of dentistry and of all other interested groups. The commission's deliberations, if favorable to the promotion of the proposed medicodental relationship, would initiate a plan of health study and health service more thorough, more generous, more idealistic and more productive than any hitherto achieved on this continent. The benefit to private medical and dental patients would be worth much; to dental and medical education, much more; to hospitals and public health program, an immeasurable advance in study, prevention and amelioration of existing conditions. Manifold benefits would also accrue to the two health professions as such. Their altruistic character could not easily be questioned; the sincerity of their efforts and the worthiness of their aims would be more widely appreciated, and their united judgments would not be overridden by public clamor, political pressure or private derogation.

BIBLIOGRAPHY

1. *J. Am. Coll. Dentists*, 7:328, December 1940.

2. *J. A. Am. M. Coll.*, 7:106, March 1932.

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WHAT TYPES OF MALOCCLUSION ARE PREVENTABLE?

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ORTHODONTICS has been no different in its growth and achievements from other well-established divisions of the remedial arts and sciences. The extreme, the bizarre, the abnormal, the unusual were easily recognized and hence were first noted. The general interest that is now being taken in preventive orthodontics is a promising indication of higher ideals and goals.

We are undoubtedly taking a broader view of our opportunities and responsibilities held jointly with general dentistry. What Sinclair Lewis calls in literature "magnificent inexactitudes" are now being replaced by statistical interpretations of more systematically recorded clinical investigations that give hope of uniting our efforts on a sound, biologic basis.

To simplify the classification of factors in malocclusion, Lischer[1] recognizes two basic divisions: the intrinsic and the extrinsic groups.

1. The intrinsic group includes all factors that are inherent in the formation of the organism and, unassociated with other causes, determine the type of deformity.

2. The extrinsic group includes all environmental or acquired injurious influences arising during the life of the organism, and the extent to which growth, development and function may be disturbed depends much on latent factors in the intrinsic group.

Because the subject involves many important correlated phases of child growth and development, it will not be possible within the hour to stress adequately all that should be said in support of what may be accomplished by the family dentist, the specialist in restorative dentistry for children or the orthodontist in partial or complete control of controllable factors in both groups. I shall therefore present only a limited review of clinical cases, but sufficient in number and type to show how the classified detrimental conditions may contribute, in varying degrees, to malocclusion and to offer for consideration prophylactic measures applicable to their control.

One purely intrinsic cause of malocclusion that occasionally occurs in deciduous or permanent dentition is a redundancy of teeth, commonly called supernumerary teeth, which interfere with occlusion in many ways. They may appear to be of normal tooth form, but usually they are malformed, both the crown and root being cone shaped. Particularly is this true of those occurring between the maxillary central incisors. In Figure 1 there are shown three malformed supernumerary teeth which are delaying development of occlusion and which should be removed as soon as it can be done without endangering the permanent central incisors. In Figure 2, there is shown between the permanent central incisors a malformed supernumerary tooth that could have been removed to the advantage of occlusion at an earlier time. Even so, its removal without further delay is promising a satisfactory closing of the space between the central incisors. (Fig.

Read before the Section on Orthodontics at the Midwinter Meeting of the Chicago Dental Society, February 22, 1944.

3.) The redundant right maxillary lateral incisor in this case must have, in the course of its eruption, affected the deciduous cuspid, causing it to be prematurely cast off and terminating its detriment to occlusion by crowding the permanent cuspid to a labial malposition. This case also shows in exhibit A in Figure 3 a prolonged retention of the second deciduous molars, which is frequently another cause of malocclusion included in the intrinsic group. Exhibit B shows the meager result that was obtained by removing the superfluous lateral incisor and the second deciduous molars. Had this service been available to the patient at an earlier time, it is reasonable to assume that the need of mechanized orthodontic therapy would have been appreciably modified.

Fig. 1.—Multiple supernumerary structures that retard development of occlusion.

Fig. 2.—Single supernumerary tooth erupted between maxillary central incisors.

Fig. 3.—Left, maxillary supernumerary right lateral incisor causing malalinement of cuspid. Right, alinement of cuspid improved by removal of supernumerary tooth.

CONGENITAL ABSENCE OF ONE OR MORE TEETH

Ways and means of preventing the development of malocclusion due to the congenital absence of one or more permanent teeth are limited. At best, a compromise of normal occlusion is about all that can be accomplished. A deciduous lateral incisor, although it can possibly be retained when the permanent one

is absent, does not conform in size with the adjacent teeth and should it be a second deciduous molar, to be retained in place of a second bicuspid, is out of proportion in size and anatomic form to serve wholly satisfactorily as a functional unit in the dental system. With allowance for such deficiencies, there are occasionally cases wherein these particular deciduous teeth have served their host over a long term of years and, from a hygienic point of view, better than artificial substitutes.

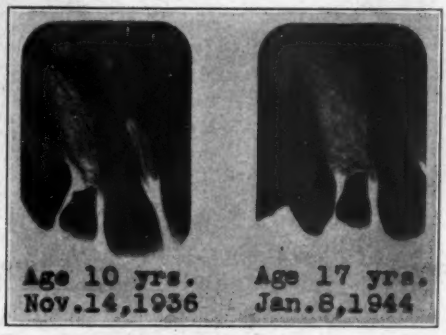

Fig. 4.—Deciduous lateral incisor retained by formation of new alveolar bone and cementum.

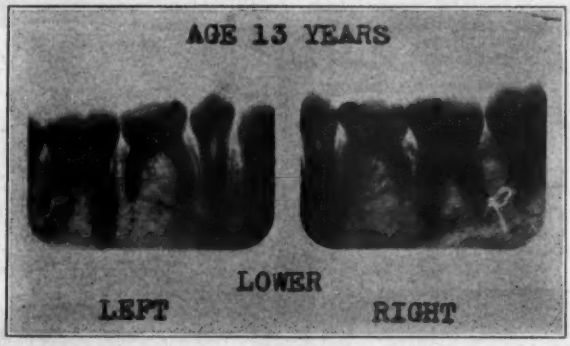

Fig. 5.—Second bicuspids absent and second deciduous molars retained to serve as functional units.

In Figure 4 are shown two roentgenograms of a deciduous lateral incisor that withstood the shock of orthodontic treatment of a Class II case, remaining as firm and serviceable as it was eight years ago. The retention of this deciduous lateral incisor can be attributed to formation of new alveolar bone and cementum which can be observed by a comparison of the roentgenogram take at the age of 10 years and the one taken at the age of 17 years.

In Figure 5 is shown a case in which the mandibular right and left second bicuspids were missing and the second deciduous molars were retained. (Fig. 6.) Frequently, in the absence of a second bicuspid, the second deciduous molar apparently sinks, with resultant dental arch

collapse and loss of functional occlusion in the affected segment. A means of recovering space is shown in exhibit B and, in exhibit C, how the second deciduous molar was restored to functional service. Regardless of how questionable the procedure may appear, there has been no

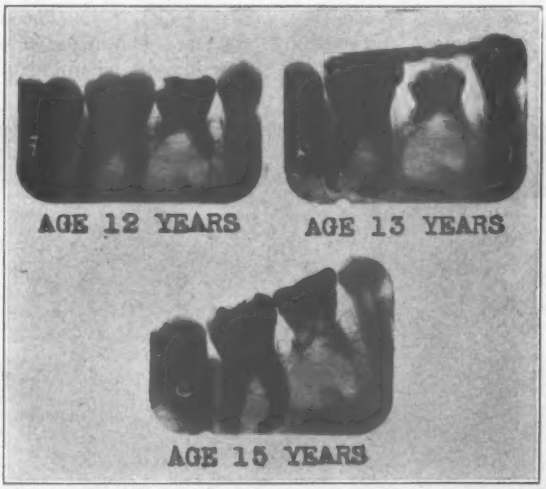

Fig. 6.—Above: Left, apparent sinking of mandibular left second deciduous molar; right, space developed for cast crown restoration. Below: Condition two years after deciduous molar was restored to functional occlusion.

Fig. 7.—Progressive inherent type of malocclusion.

undesirable change in the occlusion during the past three years.

INHERENT CHARACTERISTICS OF MALOCCLUSION

There was nothing extreme or unusual in the minor abnormality of occlusion in the cuspid area in the case of M. M. at the age of 4 years and 6 months. (Fig. 7.) In other respects, this child possessed marked inherent physical characteristics typical of the mother and the mother's brother and his son. This, we believe, established a justifiable premise that a posterior occlusion might develop at the onset of shedding of the deciduous incisors and eruption of the first permanent molars, as had been the case with her cousin.

At the age of 8, the trend of M. M.'s malocclusion was well defined, and, at

the age of 10 years and 4 months, the maternal type was definitely established. The usual contributing factors in denture maldevelopment, having been ruled out, the determining cause must come within the intrinsic group, inherent in the formation of the organism.

When dominated by inherent detrimental factors, cases of this type do not respond well to applied preventive measures.

eruption. The condition is frequently mistaken for an abnormal trend of denture growth, when in fact the apparent abnormalities are only a manifestation of individual normal growth characteristics.

An example of transitional malocclusion was observed in the case of a boy 7 years of age at the time of introduction. (Fig. 8.) The space between the maxillary incisors measured 0.15 inches, and

Fig. 8.—Transitional malocclusion.

TRANSITIONAL MALOCCLUSION

The term "transitional malocclusion" is introduced here because it carries what I have in mind concerning a variable type of malocclusion frequently occurring at the onset of exchange of deciduous teeth for permanent ones and terminating when the first molars, bicuspids and cuspids are in an advanced state of

the cause of the separation had been attributed to an abnormal frenum by another clinician, a mistaken diagnosis that is not uncommon. Hyde[2] has ably discussed this type of dental anomaly. The maxillary intercuspid width of the arch did not measure up to the required space to include the lateral incisors when those teeth erupted. Associated with these ab-

errations was an open bite, and the maxillary incisors had the appearance of protruding.

By the time that the boy attained his eighth year, the space between the maxillary central incisors was closing and the bite was not quite so open because the incisor teeth were in a more advanced state of eruption. There was also an increase of intercuspid width in both dental arches.

roots. Two years later, at the age of 11, the maxillary lateral incisors were found to be in normal alinement, the permanent cuspids were erupting and the case was promising normal functional occlusion—all accomplished by natural processes of growth and development without the aid of mechanized orthodontic therapy. It remains an open question as to whether intrinsic or extrinsic factors, or a combination of the two, were in any

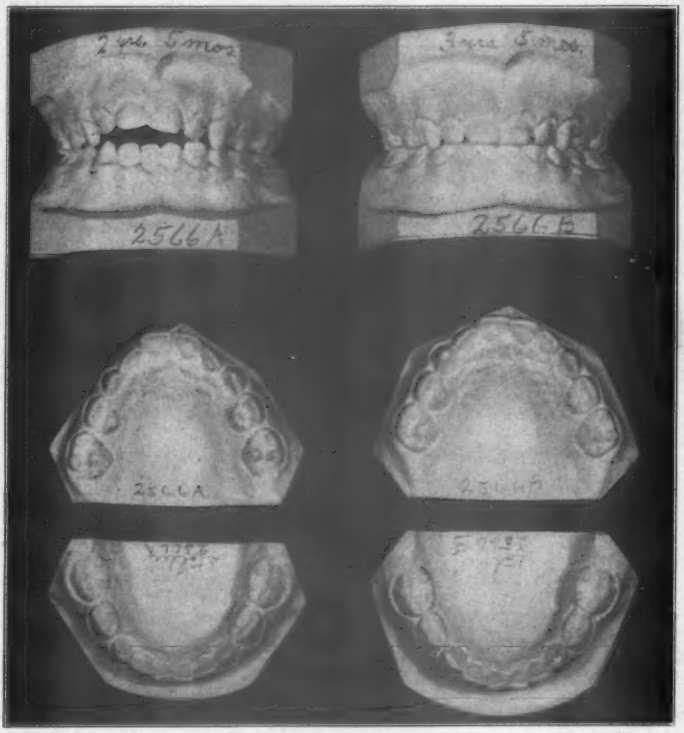

Fig. 9.—Left, distortion of dental arches from continued bottle feeding. Right, case one year after bottle feeding was discontinued.

By the ninth year, it appeared that something else had gone wrong: the maxillary lateral incisors were erupting in labial malalinement. But there was a reason for this transitional occurrence: the developing permanent cuspids were bearing down upon the lateral incisor

way involved in the transitional malocclusion that existed in this case during childhood.

AN ACQUIRED CAUSE

C. S., aged 2 years and 5 months at the time of introduction, was the young-

est of four girls of a rural family. The history as related by the parents was briefly this: They could not recall that at birth there was any deficiency in size or position of the mandible. In fact, the patient was a round-faced infant of much the same type that her three sisters had been. The changed facial outline had developed with age until, at the end of 2 years, she did not bear a family resemblance. As the mother's physical condition prohibited her nursing the child, bottle feeding was resorted to. Raw cow's milk, with possibly some modification during her early months, had been her only nourishment. She refused supplementary food of any kind and, unlike her sisters, would not drink from a cup at the appropriate weaning time. Because she was a weak child, the family physician advised continuation of bottle-feeding rather than to oppose the child. The thumb or finger sucking habit was not a factor in the abnormality of dental arch form in this particular case, but the child did persistently use the nursing bottle nipple as a pacifier.

When I was assured by the parents that the child was not at that time under the care of a physician, my advice to them was to discard the nursing bottle immediately, provide a separate dining table for the children, including the patient, and to pay no attention to her objections to such an arrangement. When hungry enough, she would eat and drink as her sisters did.

A comparison of plaster casts A that were made at the time of consultation, and casts B that were made a year later

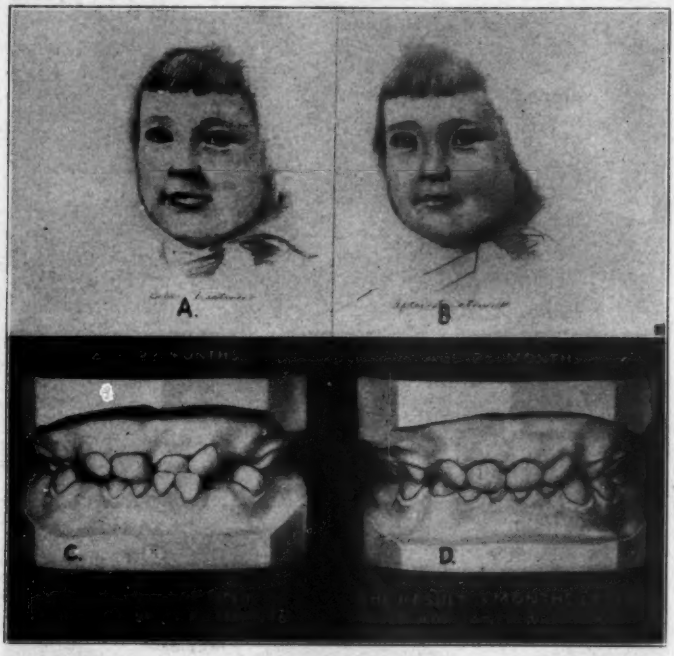

Fig. 10.—A, facial asymmetry intensified by eruption of deciduous incisors in malocclusion. B, modification of asymmetry through correction of malocclusion. C and D, condition of occlusion before and after treatment.

(Fig. 9) shows the changes in dental arch form and occlusion, which are accounted for by a correction of dietary habits. The facial outline, in keeping with the changes that occurred in dental arch form and occlusion, now bears a close resemblance to that of the sisters. Therefore, it is assumed that the factors in this case were acquired and belong to the extrinsic group.

PREVENTING THE CUMULATIVE EFFECT OF A CROSSBITE

The control of deformative processes in the case of a young child necessitates the use of corrective appliances in order to prevent a fixed type of dentofacial deformity when the deciduous teeth are replaced by the permanent ones. The case of a girl, aged 17 months at the time of introduction, will be reviewed as an illustration of this particular type of oral deformity. The child was becoming irritable because of difficulties experienced in attempting to chew the foods usually included in an adequate diet for a child of her age and state of dentition. The maxillary left central and lateral incisors had erupted in malocclusion with the mandibular ones, producing a crossbite that seriously affected functional activities. The malocclusion and malfunction were restricting growth of the facial structures in that area.

With the existing state of dentition and closely related complications, the justification for corrective treatment centralized upon a single issue: a suitable base of anchorage for an efficient appliance. Because of lack of such a base, definite action was postponed for five months, until the maxillary first deciduous molars erupted sufficiently to be fitted with cast overlays, reinforced on the occlusal surface, which slightly opened the bite and served as a base of anchorage for a 0.022 inch gage alinement wire, which was adapted and seated in small brackets soldered to the labial surfaces of central and lateral incisor bands.

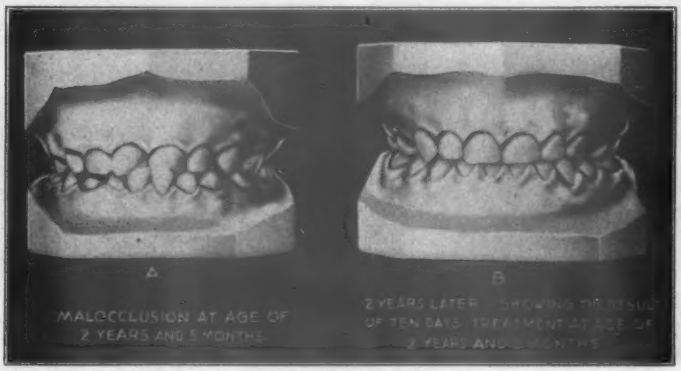

Fig. 11.—Result of ten days' treatment of case of malocclusion.

Two adjustments of the alinement wire at intervals of two weeks were sufficient to correct the malalinement of the incisors and establish normal function. The appliance was then removed and the natural developmental urge permitted to exercise its full influence. (Fig. 10.) Simple as the orthodontic problem and the applied mechanical therapy may appear in this case, an evaluation of the factors involved from the beginning to the final result plainly shows that, in that evaluation, was incorporated every principle set forth in the broad definition of

orthodontics as formulated by Abram Hoffman in 1933. "It is a biomechanical science which has for its object the prevention or correction of malocclusion of the teeth and the harmonizing of the structures involved so that the dental mechanism produced will be best suited to the functional activities of the human organism as a whole. In theory or in practice it is a study of growth and development linked with physical and mechanical principles."

1. The "prevention" of a progressive type of malocclusion.

2. The "correction" of an existing malocclusion.

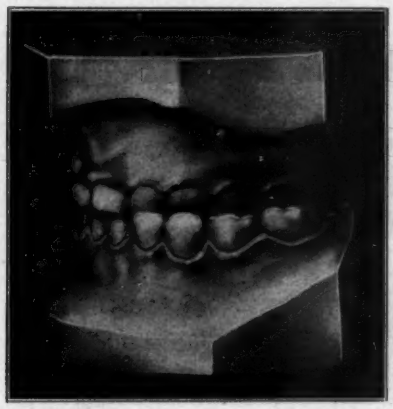

Fig. 12.—Type of crossbite frequently associated with noticeable malalinement of eyes.

3. The "harmonizing of structures involved."

4. The improvement in the "functional activities of the human organism as a whole." The child's social responses became appropriate to her age.

5. The evaluation was a study of "growth and development linked with physical and mechanical principles."

6. The case was "therefore a biomechanical science" problem.

Malocclusion in the case of L. M., a girl, at the age of 2 years and 5 months, was similar in character and treatment to the one previously described except that the maxillary deciduous central incisors locked lingually from the mandibular ones in centric occlusion and distorted the positions of the lateral incisors. (Fig. 11.) Functional activities were limited to an up-and-down movement of the mandible, and the gingival tissues were irritated because of food impaction.

The actual time spent in the active treatment of this case was ten days. A light retention was placed to support the maxillary incisors. This was done because the child could not be again available for a period of two months. Otherwise, the chance of natural support of the teeth when in function and centric occlusion would have been taken.

Fig. 13.—Malalinement of eyes.

CROSSBITE OF THE BUCCAL SEGMENTS

A close observer would detect a facial asymmetry in an infant who later developed a crossbite when the deciduous molars and cuspids erupted. (Fig. 12.) In many cases, this involves the orbit on the affected side. (Fig. 13.) When this

type of dental anomaly is properly treated before the first permanent molars erupt, not only is denture growth benefited, but also the restriction upon facial asymmetry of the face but rather is one of the symptoms. The orthodontic treatment may straighten the teeth, but it will not straighten the face."

Fig. 14.—Maxillary arch developed through force of occlusion with mechanically expanded mandibular arch.

growth is relieved to an appreciable degree. Thompson[3] very aptly says, "Malocclusion is not one of the causes of

MODIFYING THE CUMULATIVE EFFECT OF NEUTROCLUSION

Neutroclusion varies from simple to

complex. It may follow the eruption of permanent teeth even though the conditions of deciduous dentition appeared normal in every respect. It is quite probable though that, in the majority of cases, had record casts been made of the deciduous teeth at intervals of a year apart from the time that they erupted, most of them could have been traced back to a deficiency in deciduous dentition that might have been corrected during that time with much advantage to the eruption of permanent ones.

In the more extreme types of neutroclusion found during the time of deciduous dentition and prior to the eruption of the first permanent molars, there is reason for mechanically increasing the width of the dental arches. There is no justification in expanding the dental arches at the time that the mandibular permanent central incisors erupt, should they appear in malalinement when even three-fourths erupted. If the buccal function of the deciduous molars and cuspids is unimpaired, the natural urge of growth and development between the ages of 6 and 9 usually takes care of such minor conditions.

In the event of decided bunching of the mandibular permanent incisors and a deficiency in cuspid region width of such degree that there appears to be no chance of the condition becoming self-corrective, and then only, should corrective procedures other than myofunctional therapy be enforced.

Fig. 15.—Root absorption attributed to misuse of orthodontic appliances.

The simplest approach to the treatment of such a case is made through a slow and steady expansion of the mandibular arch applied from the lingual aspect. In the case of an otherwise healthy child, when the mechanical expansion is carried on slowly and the teeth are kept

comfortable for vigorous chewing, the maxillary arch usually develops through the force of occlusion with the mechanically expanding mandibular arch. In Figure 14 is shown such a case, treated in the manner described. The corrective treatment was carried on over a period of ten months and dismissed without posttreatment appliances.

During the course of normal eruption, a tooth usually travels in two or more directions—a feat that cannot be accomplished under the direct influence of any orthodontic appliance. Physiologic tooth movement is accomplished, if ever, under an indirect influence reflected upon unerupted teeth through mechanical force applied to the erupted teeth.

The correction of malocclusion in this way does not necessitate the attachment of appliances to permanent teeth or long periods of retention following active treatment.

At all times, an orthodontic appliance is a menace owing to the fact that it is foreign to the normal condition of the mouth and therefore must be regarded as the lesser of two evils; one, the approaching or existing deformity; the other, the appliance and method of its correction. The danger lies in the possibility that the appliance or some of its parts may become the greater of the two evils.

The long-continued wearing of fixed anchorage orthodontic appliances frequently starts root absorption, an example of which is now shown in Figure 15. The patient's changes of residence in the course of ten years necessitated the services of several different operators. The ultimate result of it all was a wrecked mouth and a mental state, a consequence of the mouth condition, that finally brought the girl to a psychiatrist.

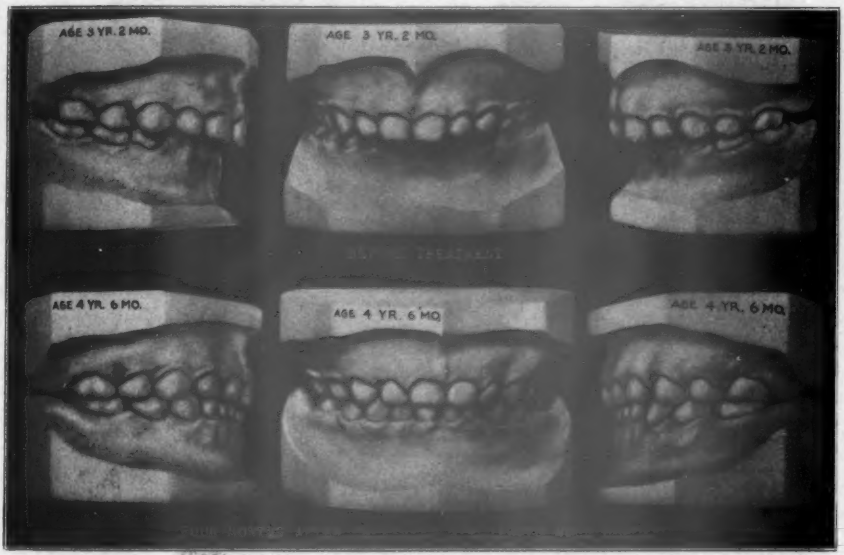

Fig. 16.—Results in case treated one year.

POSTEROCLUSION

The age at which it is advisable to begin treatment of posteroclusion has been

a much discussed problem, and there is confusion of opinions on the subject. Figure 19 presents an example of treatment of this type of anomaly between the ages of 3 and 4 years. Treatment at this age frequently promises better results than if given later. The advantages gained in a satisfactory correction of posteroclusion before root absorption starts is that the dental organism as a whole and all associated structures and functions are benefited. Future growth and development can continue under more normal conditions even though further corrective treatment may be necessary during the exchange of deciduous teeth for permanent ones.

The case of B. A., an adopted child of 11 years, with no available family history, is one in which only a tentative differential diagnosis could be made. Though the child in earlier years had

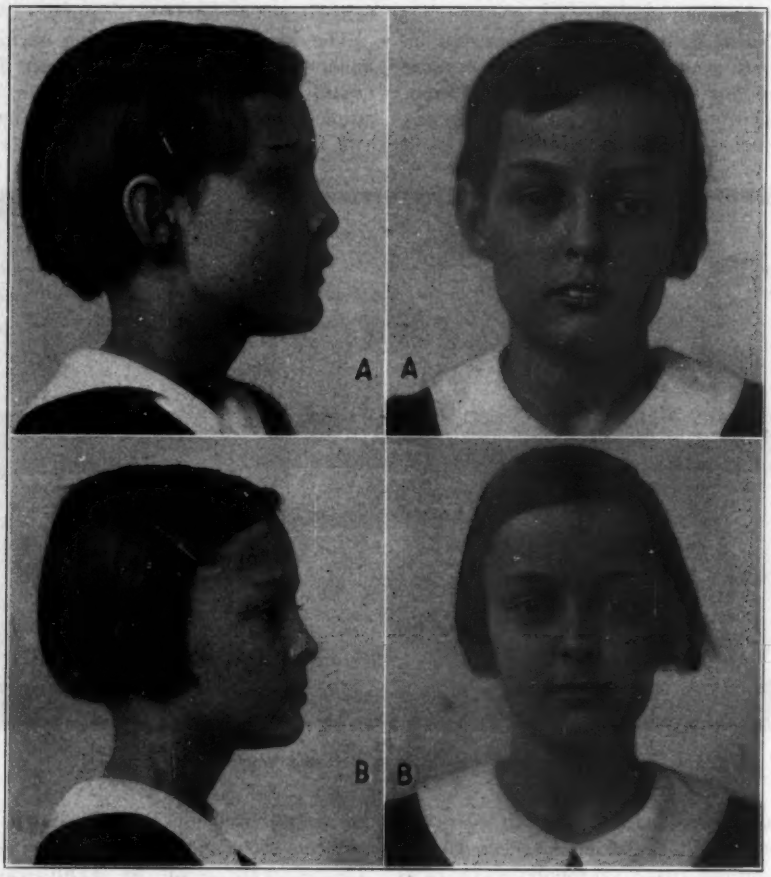

Fig. 17.—A, acquired dentofacial deformity attributed to premature loss of first deciduous molars. B, result of corrective treatment carried out during period of rapid growth and development.

been afflicted with rickets, she was at that time in fair health. The foster parents did not recall that there had been a protrusion of the maxillary deciduous incisors or any noticeable habit during infancy and early childhood that would affect dental arch form. From appearances, there were justifiable grounds to assume that any result obtained through corrective procedures would be governed by the extent to which inherent characteristics dominated. The hope of bringing about a marked improvement in functional occlusion was doubtful as the mandibular right and left first deciduous molars had been prematurely lost and spaces for the eruption of the first bicuspids had virtually closed. Through this collapse of the dental arch, anterior mandibular growth was retarded and, under the circumstances, lip biting became unavoidable. (Fig. 20.)

With the foregoing analysis of the case, corrective treatment was started, continuing uninterrupted for six months, when the upper appliance was removed and the lower one permitted to remain passive for the purpose of retention until the permanency of the corrected arch relationship could be determined.

The arch relation held well and, three months later, the lower appliance was removed. At that time, a Hawley type removable bite-plane retention plate was made for the maxillary arch to control the position of the mandibular incisors and cuspids. (Fig. 21.) What facts relative to a different diagnosis were brought to light in the course of treating this case?

1. The foster parents must have been right in their belief that no malocclusion of the deciduous teeth followed their eruption.

2. The malocclusion must have been an acquired one, principally from premature loss of the mandibular right and left first deciduous molars, this tragedy in deciduous dentition permitting a collapse of the dental arch, which prevented normal lip function.

3. The foregoing deductions further establish the fact that certain phases of malocclusion in this case could have been prevented had the deciduous teeth been properly taken care of during the initial stage of dental caries, or, in the event that the deciduous molars were prematurely lost, had suitable functional space maintainers been properly placed.

4. Dominating inherent characteristics were not factors in the dental and facial deformity as it existed when the child was introduced for corrective treatment.

SUMMARY

1. The fact must be stressed that any phase of orthodontics, simple or complex, involves a growth problem and, to keep abreast with physical developments no detail of a child's orthodontic case record should be neglected.

2. Carefully prepared record casts, inscribed with case number, name, date and age to designate the order in which they are made, are invaluable in observing the trend of dentition and the comparative results of the technic employed.

3. I wish to further impress upon those working with children that, regardless of all that can be demonstrated through what we choose to term "adequate prophylaxis" and the satisfying results possible in the majority of cases, parents must not be led to believe that malocclusion is entirely preventable. Generally speaking, many anomalies of dentition are obscure. Their origin is sealed in the mystery of heredity, the morbid factors of which in one way or another are reflected in the growth and development of the body as a whole, frequently with more pronounced manifestations in the oral ensemble.

CONCLUSION

It must be emphatically stated that the dentist, the specialist in any branch of

dentistry or the physician who is called upon to express an opinion or administer treatment of any kind that involves childhood dentition must possess a clear conception of normal occlusion, not only in the adult, but particularly in all the successive stages of growth and development from deciduous dentition at the age of 2, on through the transition to adolescence at 14.

Without such knowledge, his opinion in regard to the occurrence of malocclusion, its nature, severity of handicap to function and advisability of applied prophylaxis, is of no value. His services cannot be complete, and the parent has no means of knowing that his confidence in the practitioner has been misplaced.

Without an adequate knowledge of these conditions, a moral obligation rests upon the one consulted to refer the parent to someone who is competent to handle the situation.

The experienced and fair-minded orthodontist is not opposed to the practice of prophylactic orthodontics by the general practitioner of dentistry or medicine provided he possess the basic knowledge that is essential and has acquired, through experience, a skill and judgment that justifies his participation in such work.

"We may limit our field of work to suit our inclinations, but within those limits we are bound to serve to the utmost of our capacity." Beyond that is trespassing.

BIBLIOGRAPHY

1. LISCHER, B. E.: Principles and Methods of Orthodontics. Philadelphia: Lea & Febiger, 1912, pp. 52-74.

2. HYDE, WALTER: Pediatrician and Orthodontist. *J. Am. Coll. Dentists*, 9:304, September 1942.

3. THOMPSON, J. R.: Asymmetry of the Face. J.A.D.A., 30:1859-1871, December 1943.

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RELATIONSHIP OF DENTITION AND SPEECH

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AMONG the various problems in dentistry, little of a concrete nature has been done to dispel the confusion surrounding the relationship between the dentition and speech. A compilation of dental conditions purported to cause faulty articulation would include nearly any and all dental abnormalities. Those most prominent would include improperly contoured surfaces of restorations, rotated teeth, malposed teeth, missing teeth, malformed jaws, malrelationship of jaws, peg shaped lateral incisors and spacing between the teeth.

During 1935-1937, numerous patients were observed from the Institute for Human Adjustment Speech Clinic, and the Department of Orthodontics, School of Dentistry, Orthodontic Clinic, at the University of Michigan. Seven cases were selected for the purpose of a detailed case report. The following permanent records were taken on each subject: (1) dental case history, (2) dental casts, (3) intra-oral photographs, (4) facial photographs, (5) speech case history, (6) phonographic recording of speech and (7) speech analysis.

After a preliminary study in 1935, it was decided that the number of cases to be included should be limited to those that could be rechecked frequently and observed more minutely. The original observations were completed in the spring of 1935, and the process of checking, rechecking and further rechecking was continued until June 1937. The data in the final form are the result of more than two years of observation of these cases.

The dental records were taken in the routine manner used in the orthodontic clinic. The written speech records were taken in the same manner as those employed for incoming students of the university. (Chart 2.) The phonographic recordings were made by the technician of the speech laboratories. Speech analysis was based on conversation and test sentences. (Chart 1.) Speech was rated as excellent, satisfactory and unsatisfactory. To have some standard by which the speech results could be rated, that for incoming students to the university was used.

REPORT OF CASES

CASE 1.—H. W., a girl, sixteen years of age. (Fig. 1.) Case history was given by the patient's aunt who later became the patient's guardian. She was reported to be under treatment by the family physician for her "neurotic tendencies." At the time of examination the patient was decidedly lethargic, lacked enthusiasm, and was slovenly in her personal habits. Inquiry regarding her home environment revealed conditions which were deplorable.

The patient's general health was fair. Her

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Presented as part of the scientific exhibits at the meeting of the American Association of Orthodontists, Chicago, 1937, and the American Dental Association in St. Louis, 1938; presented at the 1938 meeting of the Michigan Society of Teachers of Speech and the 1940 meeting of the Michigan Speech Correction Association.

height and weight were above normal. Diet was defective from a qualitative standpoint, i.e., deficient in fruits and vegetables, excessive in protein and starch.

Malocclusion: Class I, Angle,* class II, Bennett. The maxillae were asymmetrical, there was a crossbite relationship between the left posterior segments. In their relationship to mandibular teeth, the teeth of the maxillae had drifted one-half cusp forward from their normal position.

The facial development in general was good.

The maxillary right central incisor was missing, the lateral incisor and canine interposed, the maxillary left lateral incisor lingually posed, and the mandibular incisors were crowded slightly.

Speech analysis: The patient omitted final s and z in conversation. Articulation lacked precision and vigor.

Speech rating: satisfactory.

CASE 2.—B. H., a boy fourteen years of age. (Fig. 2.) Case history given by the parents. His general health was good, his diet adequate, and no disease reported other than the usual childhood diseases.

The face and jaws were well developed.

Malocclusion: Class I, Angle, class I, Bennett. This case was complicated by premature loss of the mandibular deciduous second molars and congenital absence of the mandibular second premolars. There was spacing among all teeth anterior to the maxillary and mandibular first molars and rotation and protrusion of maxillary and mandibular incisor teeth.

This case was under orthodontic treatment at the time the speech examination and analysis were made. Less than half an hour before the phonographic record of his speech was made the following orthodontic apparatus had been added to his appliance: five maxillary incisor bands, springs operating through attachments on the bands and two springs operating from the mandibular lingual wire.

Speech analysis: No omissions or substitutions were observed. The speech rate was rapid but articulation was precise.

Speech rating: satisfactory.

CASE 3.—L. S., a girl, seven years of age.

CHART 1.—SAMPLE TEST WORDS AND SENTENCES

1. Sassy mice race across the ice. Zippers are easy to close.	1. Ho't.
2. Why whisper everywhere? We will win anyway.	2. Ha't.
3. Think nothing but the truth. This leather is smooth.	3. He'ck.
4. Shaving lotion will splash. Measure the position of the garage.	4. Hay'.
5. Choose a pitcher to match. John put a pigeon in the cage.	5. Hi't.
6. Find the office knife. Violets cover the grove.	6. He'.
7. Lend me a ruler and pencil. Mamma made some lemon jam.	7. Haw'k
8. Wrap the carrots with paper. New pennies shine.	8. Hu't.
9. Your young onions are yellow. Bring the singer along.	9. Her'.
10. Tie a better knot. Daddy nodded his head.	10. Hoe'.
11. Keep the pocket book. Go get a bigger egg.	11. Hoo'k.
12. Papa put paper in the pipe. Buy baby a bib.	12. Who'.
13. He hit his hand anyhow.	13. High'.
	14. How'.
	15. Hoi'st.
	16. Hue'.

1. Note: The Angle classification is used in this and subsequent cases purely as a descriptive classification and is not intended to imply a specific diagnosis.

(Fig. 3.) Case history was taken from hospital records. Her general health was good, and her diet was adequate. This patient was subjected to surgery at four years of age for a carcinoma of the left maxilla. There was heavy scar tissue overlying the operative area. To prevent further disfiguration from sagging facial tissues, a skin graft was effected between the upper left eyelid and the lower left eyelid. A perforation into the antrum remained in the area of the canine fossa.

Malocclusion: Class I, Angle, class I, Bennett complicated by loss of all teeth distal to the maxillary left lateral incisor as a result of the operation for carcinoma. There was spacing among the maxillary incisors, the maxillary left central and lateral incisors had drifted distally.

Speech analysis: There were no omissions or substitutions, the quality was infantile but the speech was clear, distinct and expressive.

Speech rating: satisfactory.

CASE 4.—J. B., a boy sixteen years of age. (Fig. 4.) Case history was given by the mother. Although in good general health this patient was underweight. The tonsils and adenoids had been removed at six years of age. His diet was examined closely by a member of the nutrition staff because of multiple dental caries. It was declared adequate. In 1932, the patient sustained severe oral injuries in an automobile accident. The maxillary right first premolar, deciduous canine, lateral incisor and left deciduous canine were lost, and the maxillary right central incisor was submerged.

Malocclusion: Class I, Angle, class I, Bennett complicated by openbite of all teeth anterior to the first molars. Facial form was abnormal. The mandibular angles were obtuse so that the chin point was in distal position. The relative anteroposterior relationship of maxilla to mandible was correct.

Fig. 1.—Case 1; class I, Angle, malocclusion.

Speech analysis: This patient omitted final s and z, occasionally omitted final t, and substituted th for final z. Articulation was poor conversationally but his speech was intelligible. Grammatical errors were frequent. The patient was totally unaware of any speech abnormality.

Speech rating: unsatisfactory.

CASE 5.—G. S., a boy nine years of age. (Fig. 5.) Case history given by the parents. His general health was good, his diet was normal. One year before this examination the patient had inadvertently taken lye into

Fig. 2.—Case 2; class I, Angle, malocclusion.

Fig. 3.—Case 3; class I, Angle, malocclusion.

his mouth. As a result, the dorsal and ventral portions of the tongue were covered with scar tissue from the right molar area to the left deciduous molar area. Fig. 5 shows the extent to which tongue action was limited by this scar tissue. The mandible was slightly underdeveloped with a characteristic lower lip curl. The mandibular recession was no more than usual in a case of this type.

Malocclusion: Class II, Angle, class III,

Bennett. There was premature loss of the mandibular right second deciduous molar and presence of a root snag of the maxillary left second deciduous molar.

Speech analysis: All vowel and consonant sounds were made clearly. His speech was clear despite limited tongue movements.

Speech rating: satisfactory.

CASE 6.—G. G., a girl twelve years of age. (Fig. 6.) Case history taken from hospital records. Her general health good. At 3 years of age, the patient suffered severe oil burns which extended from the cheeks bilaterally down the neck and onto the chest. Following this accident there had been twenty-four skin grafts. Large areas of scar tissue still covered the affected areas.

The lower lip was nearly an inch thick. Following facial surgery J. W. Kemper reported an accumulation of adipose tissue in the area of such character that he felt recurrence seemed inevitable. The weight of this tissue caused an unusual exposure of the vermilion portion of the lower lip.

Malocclusion: Class III, Angle, class III, Bennett. The maxilla was constricted. The maxillary incisors occluded lingual to the mandibular incisors. The maxillary canine spaces were partially closed with the canines superior and labial to their normal positions. All permanent teeth had erupted except the third molars and the mandibular right second premolar.

Speech analysis: Speech was quite intelligible despite occasional omission of s, z, and sh. However, the most significant feature of this case was that f and v sounds were inverted, i.e., by substituting an action of the upper lip for an action of the lower lip. The patient had never had speech training.

Fig. 4.—Case 4; class I, Angle, malocclusion.

Speech rating: satisfactory.

CASE 7.—B. S., a girl ten years of age. (Fig. 7.) Case history was taken from information from her guardian. The teeth of the patient's father were reported normal but the mother's teeth were reported irregular in a manner suggesting maxillary deficiency. Neither parent was available for examination.

The patient's general health at the time of examination was good but a dietary deficiency was reported for the first six years of her life. This condition was corrected during the four years that she had been

under the care of her guardian. X-ray evidence of rickets was negative. The tonsils and adenoids had been removed at 5 years of age. Measles and smallpox were reported at 9 years of age.

Malocclusion: Class III, Angle, class III, Bennett complicated by crossbite in the maxillary left posterior region, premature loss of deciduous molars and rotation of maxillary permanent molars.

Speech analysis: There were no omissions or substitutions and articulation was clear and precise.

Speech rating: Excellent.

Fig. 5.—Case 5; class II, Angle, malocclusion.

COMMENT

These cases represent a broad range of dentofacial anomaly and an equally broad range in speech ability. (Chart 3.)

J. B.'s dentofacial anomaly was severe, as the photographs and casts attest. (Fig. 4.) In conversation, his speech was understandable, but the quality of his voice and the lack of any semblance to precision of articulation were distracting. He was unaware of any abnormalities in his speech and made moré than an ordinary number of grammatical errors. This suggests that his speech was adequate for his demands.

G. S., B. S., and G. G. (Figs. 5, 6 and 7) may be considered as a group because their anomalies consisted of arch malrelationship with further complications. Of these, B. S. had the best speech and the fewest complications. Her speech was attractive, clear and expressive. G. G. had satisfactory speech, but, because of her severe deformity, was forced to form labial-dental sounds in an inverted manner. G. S. had satisfactory speech, having learned to use his tongue although handicapped by a large mass of scar tissue. The noteworthy feature of this group is that, despite severe deformity, each patient presented a satisfactory speech picture with no help from speech training.

B. H. and H. W. (Figs. 1 and 2) presented various types and degrees of malposition of individual teeth. These cases include examples of missing teeth, rotated teeth, interchanged teeth and protruding teeth. All cases exhibited some form or

degree of spacing. The literature would lead one to believe that neither of these patients would be able to speak with any degree of precision, yet B. H. presented quite satisfactory speech.

In the case of L. S. (Fig. 3), any discussion would be entirely inadequate. As one would expect, her speech had a childlike quality, but it was clear, distinct and indeed beautiful despite her severe deformity.

These cases are not presented to prove or disprove any particular viewpoint or theory, but simply to contribute to existing data. The number of cases is too small to form a basis for definite conclusions, but certain tendencies are apparent and certain omissions seem significant. These cases show a definite tendency to compensate for dentofacial anomaly. The psychologic factor seemed prominent in each case, but it was impossible to report on this phase since the study had not been designed to include such data. The psychologic factor was sufficiently prominent in the preliminary study to indicate that it should constitute a separate problem.

The dental implications are numerous. In the practice of dental prosthesis, dentists are prone to mutilate or even discard carefully constructed dentures simply because the patient does not present a favorable speech picture at the time that the dentures are delivered. Fundamentally, the practice of promising the patient denture adjustment to improve speech is in error. Such a practice tends to create the illusion that frequent "adjustment" will improve the dentures. Such a practice inadvertently creates doubt in the patient's mind as to the efficiency of the dentures. Also, such a practice places the responsibility primarily on the dentist.

Fig. 6.—Case 6; class III, Angle, malocclusion.

May we suggest an alternative? The dentist could advise the patient that he has combined esthetic values and function in their most desirable proportion in accordance with the dictates of the case. Any unnecessary mutilation of the dentures would destroy this balance. The dentist could then instil in the pa-

tient's mind the necessity of learning to use the dentures in speech as well as in mastication. If it takes the average patient a week or two to master dentures in mastication, why should he not need an adequate period of time, or even professional assistance, to master dentures in the production of speech?

These suggestions are not without foundation. Speech is an overlaid process; i.e., the organs used in speech function primarily for a fundamental purpose. Speech is not a vegetative function of the human body, but is learned. Speech, as

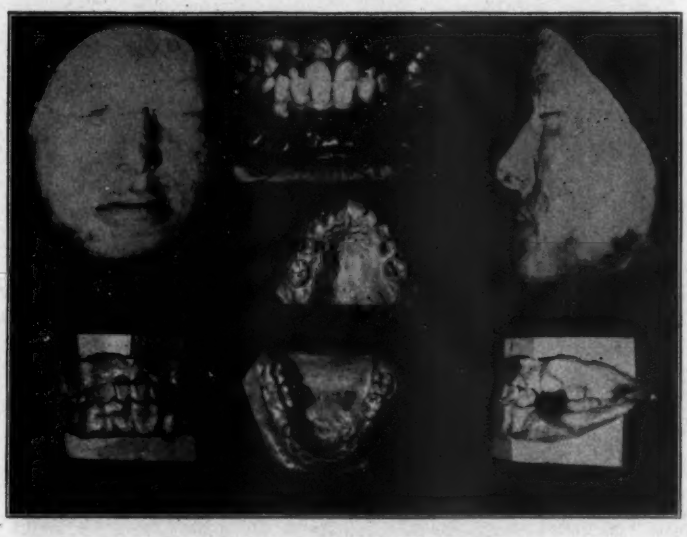

Fig. 7.—Case 7; class III, Angle, malocclusion.

other learned functions, such as running, jumping and participation in sports, may be improved and, in many cases, perfected through practice and coaching. Hence, the suggestion that mastery over dentures in the production of speech is primarily the patient's obligation.

Most dentists have a pet word or phrase to test the ability of the patient to speak, such as, "church," "Mississippi," "Schenectady" or "Saskatchewan." Such tests are obviously inadequate.

There is always the possibility that the patient may have had defective speech before the dentures were constructed. Certainly, in such cases, the professional assistance of a speech pathologist is imperative—no amount of "trimming" can correct such cases.

Somewhere among existing divergent views must lie a sound basis for evaluation of the rôle of the dentition in speech. Van Riper has written:

> Although these mouth deformities cannot be said to be essential causes of speech disorders, they certainly are contributory. . . . It should be apparent to all students of speech that transitory organic defects such as loss of front teeth can create bad speech habits which persist long after the original cause has been removed or remedied.

No one will deny that one works more efficiently and with more confidence when he has good tools in his hands. This undoubtedly obtains in the case of speech.

BIBLIOGRAPHY

1. BATEMAN, W. G.: Two Children's Progress in Speech. *J. Educ. Psych.*, 6:475-493, October 1915.

SPEECH ANALYSIS—UNIVERSITY OF MICHIGAN

DEPARTMENT OF SPEECH AND GENERAL LINGUISTICS, IN CONJUNCTION WITH UNIVERSITY HEALTH SERVICE

Name Miss / Mr. / Mrs. ..... (LAST NAME / FIRST NAME / MIDDLE NAME)

Ann Arbor address ..... Phone .....

Home address ..... (STREET NUMBER / CITY / STATE)

Hearing ..... Speech Sound Discrimination ..... Auditory Span .....

I.Q. .....

Adjustment .....

ARTICULATION

ORGANIC — Jaws ☐ Tongue ☐ Teeth ☐ Lips ☐ Palates ☐

RHYTHM — Stuttering: ☐ Mild ☐ Moderate ☐ Severe ☐

FOREIGN ACCENT — Nationality:

ORAL INACCURACY — Carelessness ☐ Rapid Rate ☐ Oral Inactivity ☐ Slurring ☐

INCORRECT SPEECH SOUNDS

	I.	M.	F.	Sub.			I.	M.	F.	Sub.	
1. s						z					
2. ʍ						w					
3. θ						ð					
4. ʃ						ʒ					
5. tʃ						dʒ					
6. f						v					
7. l						m					
8. ɹ						n					
9. j						ŋ					
10. t						d					
11. k						g					
12. p						b					

Comments:

Sample examination blank

Date ..... EXAMINER

Form 4982 9-35 5M

PHONATION

ORGANIC

QUALITY

Normal		
Muffled		
Metallic		
Nasal		
Denasal		
Harsh		
Hoarse		
Husky		
Breathy		
Thin		
Infantile		
Break		
Aphonia		

PITCH

DURATION

INTENSITY

FLEXIBILITY

Date ..... EXAMINER

Chart 2.

2. BOHN, W. E.: First Steps in Verbal Expression. *Pedagog. Sem.*, 21:578, December 1914.

3. DEWEY, MARTIN, and ANDERSON, G. M.: Practical Orthodontia. Ed. 5. St. Louis: C. V. Mosby Co., 1935.

4. DEWEY, JOHN: Psychology of Infant Language. *Psychol. Rev.*, 1:63-66, January 1894.

5. FITZ-GIBBON, J. J.: Correction of Congenital Cleft Palate Speech by Appliances. *D. Cosmos*, 72:231-238, March 1930.

6. FRIEL, SHELDON: Occlusion. *Internat. J. Orthodontia*, 13:322-343, April 1927.

7. GLASSBURY, J. A.: Prevention of Speech Disorders. *Hygeia*, 12:394-396, May 1934.

8. JOHNSON, A. L.: Basic Principles of Orthodontia. *D. Cosmos*, 63:379, April; 503, May; 596, June; 719, July; 845, August; 957, September 1923.

9. LOCKHART, J. L.: Speech. *Texas D. J.*, 51:11-13, November 1933.

10. LYNCH, D. L.: Artificial Larynx. *Apollonian*, 7:226-233, October 1932.

11. MCDOWELL, ELIZABETH: Rôle of Speech Training in Program of Orthodontic Treatment. *Internat. J. Orthodontia*, 22:105-112, February 1936.

12. MORRISON, C. E.: Speech Defects in Young Children. *Psychol. Clin.*, 8, 1915.

13. MOSES, E. R.: Critical Study and Analysis of Sound Image Contacts. Dissertation, Michigan University, 1936.

14. MOSER, H. M.: Qualitative Analysis of Eye-Movements During Stuttering. Dissertation, Iowa University, 1936.

15. MUYSKENS, J. H.: Smallest Aggregate of Speech Movement. Dissertation, Michigan University, 1925.

16. PARSONS, FREDA: Speech Training. *Brit. D. J.*, 55:306-308, September 15, 1933.

17. POOLE, I. T.: Genetic Development of Articulation. Dissertation, Michigan University, 1934.

18. RUMSEY, H. ST. J.: Cleft Palate Speech. *Brit. D. J.*, 56:239-241, March 1934.

19. SIMON, C. T.: Speech as Related to Dental Deformities. *Chicago D. Soc. Bull.*, 13:15-16, July 20, 1933.

20. STRANG, R. H. W.: Textbook of Orthodontia. Philadelphia: Lea & Febiger, 1933.

21. STRUCKE, OLUF: Diagnosis of Speech Defects. *Internat. J. Orthodontia*, 19:1007-1011, October 1933.

22. TRAVIS, L. E.: Speech Pathology. New York: Appleton-Century Co., 1931.

23. FYMBO, L. H.: Relation of Malocclusion of Teeth to Defects of Speech; in TRAVIS, L. E.: Studies in Speech Pathology II. *Arch. Speech*, 1:204-216, 1936.

24. VAN RIPER, CHARLES: Speech Correction. New York: Prentice-Hall, 1939.

25. WEST, R. W.; KENNEDY, LOW, and CARR, ANNA: Rehabilitation of Speech. New York: Harper and Brothers, 1937.

American National Bank Building.

CHART OF INCORRECT SOUNDS

	H.W.	B.H.	L.S.	J.B.	G.S.	G.G.	B.S.
s	○			○		△	
M							
θ							
ʃ				F○		△	
ʍ							
f							
l							
ɹ							
j							
t				△			
k							
p							
z	○			○		△	
w							
ʒ							
ð							
dʒ							
v							
m							
n							
ŋ							
d							
g							
b							
RATING	SATIS.	SATIS.	SATIS.	UNSAT.	SATIS.	SATIS.	EXCEL.

KEY

I - INITIAL POSITION IN WORD □ - SOUND SUBSTITUTION

M-MEDIAL POSITION IN WORD ○ - SOUND OMISSION

F-FINAL POSITION IN WORD △ - OCCASIONAL OMISSION

Chart 3.

LOW DENTAL CARIES EXPERIENCE AND FOOD PRODUCTS IN DEAF SMITH COUNTY, TEXAS

F. J. McCLURE,* Ph.D., Bethesda, Md.

IN an article appearing about two years ago,[1] an unusually low prevalence of dental caries was reported for residents of Deaf Smith County, Texas. Certain analytic data appearing in the article were regarded by the author as indicating an unusual mineral content, particularly phosphorus, and to some extent calcium, as characteristic of Deaf Smith County produce. These data have more recently been interpreted also as indicating an association of calcium and phosphorus with fluorine in bringing about a reduction in dental caries.[2, 3] This suggestion of the involvement of calcium and phosphorus in the effect of fluorine on dental caries gives a questionable aspect to that particular phase of fluorine physiology. For this reason, the calcium and phosphorus analytic data in the article[1] should be carefully evaluated.

While there is no doubt that a low dental caries experience may be observed in Hereford (county seat) and in other parts of Deaf Smith County, there is abundant epidemiologic evidence that a low rate of dental caries is also characteristic of other communities using drinking waters containing fluorine within the range common to Deaf Smith County.[4] The water supply of Hereford, it may be noted in this connection, contained 3.1 parts per million of fluorine as of November 1941. (Data from Elias Elvove, senior chemist, National Institute of Health, U. S. Public Health Service.)

Before examining the calcium and phosphorus data, it may be of interest to call attention to the variations in dental caries diagnosis that may occur between different examiners. For example, in May 1941, F. A. Arnold, Jr., of the National Institute of Health, U. S. Public Health Service, examined sixty children aged 12-14 years who had lived continuously in Hereford or in Deaf Smith County. In Taylor's original report,[1] fifty-four children aged 12-14 showed a dental caries experience of 101 teeth affected per hundred children. Arnold, on the other hand, observed a dental caries experience in permanent teeth of 147 per hundred children, or a rate of 155 for all teeth (deciduous and permanent). In the fifty-four children referred to in Taylor's report, thirty-three (61.1 per cent) were recorded as having no decayed, missing or filled teeth, whereas Arnold found only twenty-three (38.3 per cent) caries-free cases among the sixty children examined by him. It may be noted also that Arnold reported a 100 per cent incidence of dental fluorosis, suggestive of a relatively high fluorine intake.[5]

The suggestion that produce of Deaf Smith County is exceptional in mineral content is based on comparisons with a very limited number of other analyses of similar produce. However, a large quantity of such analytic data is available in the literature. The variability in such data, particularly for vegetable produce, may be due to a number of different factors.

In order to be able to study and to compare more extensively Deaf Smith County produce with similar produce from other localities, additional data

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*Senior biochemist, National Institute of Health, U. S. Public Health Service.

TABLE 1.—CALCIUM AND PHOSPHORUS CONTENT OF FOOD PRODUCTS OF DEAF SMITH COUNTY, TEXAS,* AS COMPARED WITH FOOD PRODUCTS GROWN IN OTHER LOCALITIES

Item and Locality	No. of Samples	Original Moisture	Minerals in Fresh Material			Comment	Reference
			Ash	Calcium	Phosphorus		
Carrots			%	%	%		
Deaf Smith Cty., Texas	—	—	—	0.0438	0.067		1
Bryan, Texas	1	91.14	—	0.028	0.039		‡
Weslaco, Texas	1	91.20	—	0.028	0.035		‡
Massachusetts	1	89.20	0.95	—	0.047		6
Massachusetts	1	86.10	0.90	0.035	0.047	Carrots were scraped	6
Massachusetts	1	89.50	0.95	—	0.039	prior to analysis	6
Massachusetts	1	88.70	0.89	0.028	0.040		6
Locality not reported	—	—	—	0.042	0.040	Edible portion	7
Locality not reported	—	—	—	0.046	0.042	Fresh carrots	9
Locality not reported	—	89.80	0.92	0.050	0.039	—	10
Turnip greens							
Deaf Smith Cty., Texas	—	—	—	0.273	0.0658		1
Massachusetts	7	86.90	1.895	—	0.043	Turnip tops	6
Alabama	1	89.26	1.43	0.242	0.060	Turnip tops	17
Locality not reported	—	88.01	1.80	0.216	0.0747		10
Locality not reported	—	—	—	0.347	0.049		9
Locality not reported	—	—	—	0.254	0.058	Turnip tops, fresh	7
Green beans							
Deaf Smith Cty., Texas	—	—	—	0.0481	0.0576		1
Bryan, Texas	—	87.46	—	0.064	0.057		‡
Massachusetts	1	92.60	0.648	—	0.028	Snap beans, wax	6
Massachusetts	1	92.10	0.724	—	0.037	(Phaseolus vulgaris L.)	6
Massachusetts	1	90.20	0.651	0.044	0.035	Snap beans, wax	6
Locality not reported	—	—	—	0.065	0.044	Snap or string beans	7
Locality not reported	—	—	—	0.055	0.053		9
Cabbage							
Deaf Smith Cty., Texas	—	—	—	0.0768	0.0539		1
Weslaco, Texas	1	93.02	—	0.092	0.029		‡
Bryan, Texas	1	90.60	—	0.064	0.044		‡
Ohio	1	93.05	0.50	0.041	0.018		8
Massachusetts	1	93.60	0.734	—	0.035	Brassica oleracea	6
Massachusetts	1	93.10	0.566	—	0.019	Var. capitata L.	
Massachusetts	1	92.80	0.690	0.054	0.037	Var. capitata L.	6
Massachusetts	1	92.70	0.631	—	0.028	Var. capitata L.	6
Massachusetts	1	92.50	0.730	0.070	0.029	Var. capitata L.	6
Massachusetts	1	92.60	0.664	—	0.028	Var. capitata L.	6
Wisconsin	—	92.9	—	0.038	0.023	Minimum value	11
Wisconsin	—	93.9	—	0.053	0.036	Maximum value	11
Alabama	—	91.7	0.688	0.046	0.040	Headed (max.)	17
Alabama	—	89.9	0.636	0.030	0.029	Headed (min.)	17
Locality not reported	—	—	—	0.045	0.028	Cabbage, headed	7
Locality not reported	—	—	—	0.425	0.072	Loose outer leaves	7
Locality not reported	—	—	—	0.045	0.033	——	9

*Reported by Taylor.

Lettuce							
Deaf Smith Cty., Texas	—	—	—	1.043	0.499		1
Massachusetts	1	94.40	0.967	0.068	0.033	Boston type	6
Massachusetts	1	96.00	0.439	0.014	0.023	Iceberg, Ariz.	6
Massachusetts	1	95.90	0.405	0.015	0.021	Iceberg, Calif.	6
Massachusetts	1	95.50	0.397	0.023	0.009	New York No. 12	6
Massachusetts	13	95.50	0.522	—	0.012	(average results)	6
Greenhouse (max.)	—	90.40	1.27	0.092	0.024	250 lb. super-	17
Greenhouse (min.)	—	90.17	0.99	0.066	0.015	phosphate per acre	17
Greenhouse (max.)	—	88.4	1.16	0.081	0.038	2,000 lb. super-	17
Greenhouse (min.)	—	85.6	0.87	0.070	0.027	phosphate per acre	17
Locality not reported	—	—	—	0.054	0.031	—	7
Locality not reported	—	—	—	0.050	0.046	Romaine, head	9
Locality not reported	—	94.0	1.71	0.036	0.0306	—	10
Cow's milk							
Deaf Smith Cty., Texas	—	—	0.71	0.114	0.096	Cream O'Plains Dairy	1
Deaf Smith Cty., Texas	—	—	0.72	0.114	0.105	Prairie Dairy	1
Ohio	11	—	0.78	0.109	0.091	Holstein selected samples	14
Ohio	1	90.41	0.69	0.128	0.094	Skim milk	8
Illinois	19	—	0.74	0.114	0.104	Holstein complete lactation	12
Illinois	16	—	0.71	0.113	0.091	Ayrshire, complete lactation	12
Pennsylvania	138	—	0.76	0.112	0.094	Holstein, complete lactation	15
Flour							
Deaf Smith Cty., Texas	—	—	0.413†	0.274†	0.087†	Hereford flour	1
Keenan, Texas	1	11.35	—	0.057	0.201	Graham flour	‡
Kansas	1	11.32	—	0.064	0.096	White flour	‡
Kansas	1	12.27	—	0.036	0.087	White flour	‡
New Jersey	1	12.01	—	0.079	0.314	Whole wheat flour	‡
Utah	49	—	1.85	0.079	0.425	Wheat	12
Ohio	—	12.31	1.64	0.050	0.373	Wheat	8
Ohio	—	13.92	0.165	0.019	0.088	Wheat flour	8
Ohio	—	34.62	1.11	0.025	0.088	White bread	8
Ohio	—	10.02	6.06	0.125	1.110	Wheat bran	8
Ohio	—	10.52	3.72	0.120	0.830	Red dog flour	8
Massachusetts	1	—	0.49	0.022	0.146	Patent flour, spring wheat	6
Massachusetts	1	—	0.42	0.029	0.089	Patent flour, winter wheat	6
Massachusetts	1	—	0.53	—	0.116	Flour, hard wheat	6
Massachusetts	1	—	0.49	—	0.114	Flour, soft wheat	6
Massachusetts	1	—	2.04	—	0.499	2nd clear flour spring wheat	6
Massachusetts	1	—	1.56	—	0.357	2nd clear flour winter wheat	6
Massachusetts	1	—	1.94	0.052	0.454	Graham flour	6
Osser, Minn.	1	—	2.42	0.048	0.616	Spring wheat	10
Osser, Minn.	1	—	2.10	0.039	0.511	Winter wheat	10
Minnesota	19	10.5	2.16	0.046	0.509	Red dog flour	12
North Dakota	—	—	0.482	0.018	0.116	Patent flour	10
North Dakota	—	—	0.804	0.023	0.191	Clear flour	10

†The apparent discrepancy in the relations of these figures is discussed in the text.

‡Communication (February 1944) from G. S. Traps, Chief of the Division of Chemistry and State Chemist, Texas Agricultural Experiment Station.

from the literature have been assembled (Table 1). After inspecting these data, it seems difficult to agree with the suggestion that there is an unusual content of calcium and phosphorus in Deaf Smith County produce, except perhaps in lettuce. In this case, however, the nature of these values, 1.043 per cent calcium, and 0.449 per cent phosphorus, is such as to suggest strongly a need for confirmatory data. The ash and moisture content also would be valuable information to include in any additional studies regarding this product. In this connection, it may be of interest to note the results for calcium and phosphorus in lettuce listed under reference 20, Table 1. Greenhouse lettuce plants heavily fertilized with superphosphate which contains calcium may be compared with plants having a much lower fertilizer treatment. The increase in calcium content was negligible. There was some increase in average phosphorus content, presumably due to fertilization. Nevertheless, the maximum values for these lettuce samples do not approach the reported analyses for Deaf Smith County lettuce.

The calcium and phosphorus content of milk, as reported for Deaf Smith County, does not appear to be essentially different from milk produced in other areas of the United States. (Table 1.)

TABLE 2.—COMPARISON OF CALCIUM AND PHOSPHORUS CONTAINED IN EQUAL SERVINGS OF "AVERAGE" AND DEAF SMITH COUNTY VEGETABLES, AND IN ONE QUART OF MILK

Food and Serving	Source	Weight		Calcium		Phosphorus	
		Oz.	Gm.	Per Cent	Gm.	Per Cent	Gm.
Fresh carrots, ¾ cup, ½ inch cubes	Rose Table I,‡	3.5	100	0.046	0.046	0.035	0.035
	Deaf Smith Cty.	3.5	100	0.0438	0.044	0.067	0.067
Turnip greens, ¾ cup steamed	Rose Table I,	3.5	100	0.345	0.345	0.048	0.048
	Deaf Smith Cty.	3.5	100	0.273	0.273	0.0658	0.066
Green beans, ¾ cup, 1 inch pieces	Rose Table I,	3.5	100	0.055	0.055	0.053	0.053
	Deaf Smith Cty.	3.5	100	0.0481	0.048	0.0576	0.058
Cabbage, 1¼ cups chopped	Rose Table I,	3.5	100	0.046	0.046	0.026	0.026
	Deaf Smith Cty.	3.5	100	0.0768	0.077	0.0539	0.054
Lettuce, 9 leaves, 9 inches long	Rose Table I,	3.5	100	(0.046)	—	(0.053)	—
	Deaf Smith Cty.	3.5	100	(1.043)	—	(0.499)	—
Total vegetables (exclusive of lettuce)	Rose Table I,	14.0	400	0.123	0.49	0.044	0.16
	Deaf Smith Cty.	14.0	400	0.110	0.44	0.061	0.25
Whole milk, 1 quart	Rose Table I,	34.4	975	0.118	1.15	0.093	0.91
	Deaf Smith Cty.	34.4	975	0.114	1.11	0.096	0.94

‡Rose, Mary S.: Reference 9, Table 1: Nutritive Value of Foods in Shares

The reported analysis of Hereford flour (Table 1 in Dr. Taylor's article) is as follows:

Ash at 900° C.....0.413 per cent
Calcium .....0.274 per cent
(CaO) .....0.383 per cent
Phosphorus .....0.087 per cent
(P_2O_5) .....0.199 per cent

These results show the combined percentages of calcium oxide (0.383) and phosphorus pentoxide (0.199) to equal 0.582, a figure which exceeds the total ash value 0.413 as reported in this analy-

sis. It is unusual that the combined weight of oxides of calcium and phosphorus should exceed the total weight of ash, in analytic results of this nature. In addition to calcium and phosphorus oxides, other mineral oxides must also be accounted for in the total ash figure. It may be suggested that the value 0.274 that the milling process may have a great deal to do with the composition of flour and thus with its mineral content.[10]

In Table 2, quantities of calcium and phosphorus contained in average servings of vegetables of Deaf Smith County origin as compared with average vegetables[9] are presented for inspection.

Table 3.—Composition of Soils of Deaf Smith County, Texas as Compared with Childress County, Texas, and Soils from Humid and Arid Regions of the United States*

Texas County		Deaf Smith			Childress		Soils from Humid and Arid Regions	
Soil Series		Amarillo Silty Clay Loam			Kirkland Silty Clay Loam			
Sample		Surface	Subsoil	Deep Subsoil	Surface	Subsoil		
Reference Description		(a)	(b)	(c)	(d)	(e)	(f)	(g)
Phosphoric acid	(%)	0.07	0.03	0.04	0.11	0.09	0.11	0.12
Nitrogen	(%)	0.13	0.07	0.05	0.09	0.07	—	—
Potash	(%)	0.53	0.75	0.79	1.00	1.21	0.22	0.73
Lime	(%)	0.80	1.19	1.43	2.32	2.66	0.11	1.36
Magnesia	(%)	0.47	0.71	0.79	3.04	1.53	0.23	1.41
Alumina and oxide of iron	(%)	8.03	6.31	11.42	9.90	11.91	7.43	13.64
Insoluble and soluble silica	(%)	81.22	77.33	80.90	72.24	71.85	88.24	77.83
Loss on ignition	(%)	4.93	4.76	4.48	5.86	6.33	3.64	4.95
Moisture	(%)	2.25	3.55	3.06	3.66	2.87	—	—
Active phosphoric acid	(ppm)	200.5	76.5	—	434.1	—	—	—
Active potash	(ppm)	615.3	458.8	—	435.3	—	—	—
Acidity	(ppm)	0	0	—	0	—	—	—

*Texas soil analyses taken from Texas Agr. Exper. Sta. Bull. 173 by G. S. Fraps; analyses of humid and arid soils taken from Bull. 770. Dept. of Interior. Data of Geochemistry, Fifth Edition by F.W. Clark.

(a) Amarillo silty clay loam, depth 0-7 inches; brown loam; sample taken one mile southeast of Hereford.

(b) Subsoil to sample (a), depth 7-20 inches; brown clay loam.

(c) Deep subsoil to sample (a), depth 20-30 inches, yellowish loam.

(d) Kirkland silty clay, depth 0-12 inches, reddish brown heavy silt loam; 5 miles northwest of Kirkland.

(e) Subsoil to sample (d), depth 12-36 inches, reddish brown heavy silt loam.

(f) Average composition of 466 soils from the humid regions of the Southern states.

(g) Average composition of 313 soils from the arid regions of California, Washington and Montana.

per cent calcium, is a typographical error, the figure 0.0274 being more nearly normal. This later value (0.0274) for calcium in Hereford flour, is less than calcium in "Standard Flour" (see Table 1 in Taylor's report.[1]) The phosphorus figure for Hereford flour does not appear to be unusual in comparison with other results. It should be noted, however, These figures indicate also the slight effect which minor variations in the calcium and phosphorus content of such vegetables may have on the calcium and phosphorus which may be provided, for example, by milk alone in the average diet.

The soil of Deaf Smith County is mentioned as being "underlaid with a clay

known as caliche . . . very high in assimilable calcium carbonate."[1] In this instance, it would appear that the word caliche is used colloquially to describe a local mineral deposit. The most extensive soil type of the Texas panhandle, including Deaf Smith County, is known as Amarillo silty clay loam.[16] This is described as follows by Fraps[16]:

> The surface soil consists of a light brown or chocolate-brown silty loam averaging in depth from 3 to 5 inches. Below this to a depth of 18 to 24 inches the soil is redder and heavier in texture. Calcareous material is found at a depth of 18 to 24 inches. The surface soil is friable and easily tilled after the first plowing, but when not cultivated it is quite firm and compact. . . . The Amarillo Silty clay loam was formed by the weathering of the heavier Tertiary deposits and it is probable that the wind has played an important part in the formation of the silty layer which covers the surface.

An analysis of soils from Deaf Smith County is shown in Table 3. A sample of deep subsoil taken one mile southeast of Hereford at a depth of from 20 to 30 inches contained 1.43 per cent lime (CaO). In Childress County, located on the eastern border of the Texas panhandle, a sample of subsoil taken at a depth of from 12 to 36 inches contained even more lime; i.e., 2.66 per cent. The lime content of Deaf Smith County surface soil also appears to be somewhat less than the average for 313 specimens of soil from arid regions of California, Washington and Montana[13] and less than lime contained in the surface soil of Childress County, Texas.[16]

SUMMARY

The assumption that unusually large quantities of calcium and phosphorus are present in certain Deaf Smith County (Texas) produce is not supported by comparisons which may be made with analytic data for similar produce grown in other parts of the country.

The suggestion that the inhibitory effects of fluorine on the intensity of dental caries is influenced by calcium and phosphorus variations in local diets does not seem justified by any evidence thus far presented.

BIBLIOGRAPHY

1. TAYLOR, EDWARD: Preliminary Studies on Caries Immunity in Deaf Smith County (Texas) Area. J.A.D.A., 29:438, March 1942.

2. BRANSON, C. B.: Practical Fluorine Therapy in Dental Caries Control. J.A.D.A., 31:71, January 1, 1944.

3. HAROOTIAN, S. G.: Influence of Administration of Bone Flour on Dental Caries. J.A.D.A., 30:1396, September 1, 1943.

4. DEAN, H. T.: Domestic Water and Dental Caries. *J. Am. Water Works A.*, 35:1161, 1943.

5. Fluorine and Dental Health. Pub. 19, American Association for Advancement of Science, 1942.

6. HOLLAND, E. B., and RITCHIE, W. S.: Trace Metals and Total Nutrients in Human and Cattle Foods. Bull. 379, Massachusetts Agricultural Experiment Station, 1941.

7. SHERMAN, H. C.: Chemistry of Food and Nutrition. Ed. 6. New York: Macmillan Co., 1941.

8. FORBES, E. B.; BEEGLE, F. M., and MENSCHING, J. E.: Mineral and Organic Analysis of Food. Bull. 255, Ohio Agricultural Experiment Station, 1913, p. 211.

9. ROSE, MARY S.: Foundations of Nutrition. Ed. 3. New York: Macmillan Co., 1938, p. 539.

10. WINTON, A. L., and WINTON, KATE B.: Structure and Composition of Food. New York: John Wiley & Sons, Inc., 1935.

11. PETERSON, W. H., and PETERSON, C. B.: Water Soluble Content of Calcium and Phosphorus in Cabbage. *J. Agr. Res.*, 33:695, 1926.

12. MITCHELL, H. H., and MCCLURE, F. J.: Mineral Nutrition of Farm Animals. Bull. 99, National Research Council, 1937.

13. CLARKE, F. W.: Data of Geochemistry, Bull. 770, Ed. 5. Dept. of Interior, 1924.

14. FORBES, E. B., *et al.*: Mineral Metabolism of Milch Cow. *J. Biol. Chem.*, 52:281, May 1922.

15. FORBES, E. B., *et al.*: Annual Cycle of Mineral and Nitrogen Metabolism of Milch Cow. Bull. 319, Pennsylvania Agricultural Experiment Station, 1935.

16. FRAPS, G. S.: Composition of Soils of Texas Panhandle. Bull. 173, Texas Agricultural Experiment Station, 1915.

17. BISHOP, E. R.: Calcium and Phosphorus Content of Some Alabama Vegetables. *J. Nutrition*, 8:239, August 1934.

AN ANALYSIS OF THE NUMBER AND DISTRIBUTION OF ACTIVE DENTISTS IN THE UNITED STATES

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FOR many reasons associated with the future plans of dental practice, of public health and of dental education, information regarding the personnel resources of the dental profession is desirable. Any study directed toward securing the necessary data should be based on the fact that although a political entity, the United States nevertheless presents many and wide differences in its geographic characteristics, in the character and concentration of its population and in many other conditions. It is essential that these differences be taken into consideration in any broad analysis of the availability of dental care. The data derived from such a study must in turn be weighed against public dental need, expressed not only in terms of the prevalence of oral diseases, but also in terms of the existing body of worth while knowledge which should be applied in prevention, control or treatment. Furthermore, it should be considered that whatever meanings these findings may have at any time will be altered by research, by progress in dental education and by the many social and economic pressures common to a world of rapid change.

I

The 16th Federal Census, April 1940, enumerated 70,417 dentists who stated that they were employed or were seeking work. The Census enumeration does not, as many imply, include all of the dentists in the United States, for the total number of dentists includes (a) those enumerated by the Census and who can be called active dentists, (b) those who are only partially active, (c) those who have entered some other field and (d) those who have retired because of age or ill health or for other reasons. The census enumeration is the most reliable one available at this time, and doubtless will continue to be until the organized dental profession maintains an annual directory.

It is probable that a great number of conditions may in varying degrees influence the distribution of dental personnel throughout the United States. These may include (a) per capita income, (b) age composition of population, (c) population density, (d) educational composition of population, (e) racial composition, (f) climate, (g) food habits, (h) fluorine content of water supplies and (i) the condition of the soil.

While there is certainty regarding the influence of a number of these conditions, others lend themselves to considerable speculation as to the extent to which they are involved. Nevertheless, all have been studied to a point where their inclusion as modifying elements appears to be warranted. Therefore, in any extensive study regarding the distribution of dental personnel, it may be desirable to

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take into account at least some of the influences that have been mentioned, and perhaps many others.

The distribution by geographic district of the dentists enumerated in the 16th Federal Census is shown in column 1 of Table 1. In column 2, there is shown the 1940 dentist : population ratios, which vary from 1 : 1,290 in the Pacific region to 1 : 4,780 in the East South Central. These ratios become more significant when they are studied in the light of some of the various influences previously mentioned.

Column 3 of Table 1 indicates the population per square mile for each geographic district. The relation of the dentist : population ratios to population density presents interesting opportunities for speculation. The New England, East North Central and West North Central sections have approximately the same ratios, yet the population per square mile varies from 26.5 in the West North Central to 135.5 in New England. The South Atlantic has more than double the population density of the West South Central, yet the ratios do not reflect this difference.

The apparent lack of correlation between dentist : population ratios and the population per square mile is doubtless brought about by many conditions. However, it is probable that the most significant influences are the geographic, agricultural or industrial characteristics of the various regions. In New England, the concentration of population is on the coast and in the industrial section of the southern areas. The Middle Atlantic presents a more even distribution, while that of the East North Central, where there is a fairly even division of agriculture and industry, is less so. Mountainous areas, desert, farms of large acreage cause unevenness in the population distribution of other geographic regions. Therefore, it is essential that analysis of states and geographic districts for the purpose of determining the accessibility of their populations to dental personnel include consideration of population distribution. Dentists will not tend to locate in remote or sparsely settled areas, and yet the total number of people living in such areas is considerable. Better roads and improved methods of transportation have widened the area which a dentist may serve effectively, and this condition is very likely to continue. Therefore, it is expected that increased accessibility to sources of dental service may in the future increase the demands upon dental personnel by many persons who reside in thinly populated areas.

In regard to the distribution of den-

TABLE 1.—DISTRIBUTION OF DENTISTS BY GEOGRAPHIC DISTRICTS; POPULATION PER SQUARE MILE; PERCENTAGE URBAN AND RURAL, AND DENTIST : POPULATION RATIO (1940)

	Dentists	Dentist: Population Ratio	Population per Square Mile*	Per Cent Urban	Per Cent Rural
New England	5,038	1 : 1,674	135.5	76.1	23.9
Middle Atlantic	18,900	1 : 1,457	274.0	78.8	23.2
East North Central	16,327	1 : 1,630	108.7	65.5	34.5
West North Central	8,493	1 : 1,591	26.5	44.3	55.7
South Atlantic	5,606	1 : 3,001	66.4	38.8	62.1
East South Central	2,662	1 : 4,780	59.7	29.4	70.6
West South Central	3,934	1 : 3,320	30.3	39.8	60.2
Mountain	1,911	1 : 2,171	4.8	42.7	57.3
Pacific	7,544	1 : 1,290	30.4	65.3	34.7

*16th Bureau of the Census, Vol. 1, 1940.

tists, it may be of interest to note the distribution of dental students according to residence by states during the ten years 1933 to 1938 and 1940 to 1943 (Table 2). It will be noted that more than 51 per cent of all students have been residents of the six states, New York, Pennsylvania, California, Illinois, New Jersey and Ohio. Incidentally, these six states had in 1940 approximately 49 per cent of the whole number of dentists. This distribution of dental students apparently represents differences in state per capita incomes, racial composition, educational composition and perhaps all other factors in the distribution of dentists. It is true, of course, that all students do not after graduation return to their home states. However, migration apparently has not been a significant factor.

TABLE 2.—ANNUAL AVERAGE DISTRIBUTION OF DENTAL STUDENTS ACCORDING TO RESIDENCE BY STATES, 1933-1938; 1940-1943*

Alabama	0.92	Nebraska	1.23
Arizona	0.31	Nevada	0.06
Arkansas	0.62	New Hampshire	0.34
California	6.13	New Jersey	5.39
Colorado	0.58	New Mexico	0.21
Connecticut	2.26	New York	21.21
Delaware	0.21	North Carolina	1.52
Dist. of Columbia	0.83	North Dakota	0.46
Florida	1.15	Ohio	4.34
Georgia	0.96	Oklahoma	1.02
Idaho	0.36	Oregon	1.03
Illinois	7.48	Pennsylvania	6.75
Indiana	1.97	Rhode Island	0.81
Iowa	1.94	South Carolina	0.55
Kansas	1.00	South Dakota	0.33
Kentucky	1.06	Tennessee	1.13
Louisiana	1.42	Texas	2.98
Maine	0.42	Utah	0.75
Maryland	1.10	Vermont	0.23
Massachusetts	3.24	Virginia	1.23
Michigan	3.82	Washington	1.13
Minnesota	2.69	West Virginia	0.82
Mississippi	0.65	Wisconsin	2.29
Missouri	2.37	Wyoming	0.25
Montana	0.45		

*Dental Students Register: (a) Dental Educational Council of America, 1933 to 1938. (b) Council on Dental Education, American Dental Association, 1940 to 1943.

Another way to illustrate the distribution of dentists according to population is to compare the percentage of the whole number of dentists in a state or geographic district with the state or district percentage of the whole population (Table 3). In general, it appears that, in the northern states, the percentage of the whole number of dentists either equals or exceeds the percentage of the whole population. In the southern states, the situation is quite different, the percentage of the whole number of dentists being substantially below that of the population.

TABLE 3.—PERCENTAGE OF WHOLE POPULATION AND PERCENTAGE OF WHOLE NUMBER OF DENTISTS BY GEOGRAPHIC DISTRICTS

	Percentage of Whole Population*	Percentage of Whole Number of Dentists†
New England	6.39	7.16
Middle Atlantic	20.98	26.84
East North Central	20.21	23.20
West North Central	10.25	12.07
South Atlantic	13.50	7.97
East South Central	8.19	3.78
West South Central	9.93	5.60
Mountain	3.15	2.67
Pacific	7.40	10.71
	100.00	100.00

*16th Bureau of the Census, Vol. 1.

†Computed on basis of enumeration of dentists, 16th Census.

It is clear that there is a close correlation between the per capita income of a state or geographic district and dentist: population ratios, or the relation of the percentage of the whole number of dentists to the percentage of the whole population. While the per capita income of a region is the major element in the ability to pay for dental service, it also influences directly the educational composition of the population and, as a consequence, the desire to purchase dental care. People who are illiterate or who have had but little schooling are as a general rule less likely to profit from health education

programs and to show interest in the conservation of their health than are those who have had good schooling. Therefore, it appears reasonable to assume that, in the low income states and geographic districts, not only is the ability to purchase dental care at a lower level than in areas of higher income, but so also is the appreciation and total demand. It is natural that the areas of higher income should have the greatest number of dentists per unit of population.

The fact that the South Atlantic, the East and the West South Central regions have comparatively low per capita incomes is well known. At the same time, the expenditure for public education in these areas is from one third to one fourth of that of New England, the North Atlantic and other geographic districts. It is inevitable that this difference in expenditure for education reflect a difference in the prevalence of absolute or functional illiteracy among both sexes of whites and non-whites.

TABLE 4.—RACIAL COMPOSITION OF POPULATION, 1940*

	White	Negro	Other Races		White	Negro	Other Races
New England	98.8	1.2	0.1	East South Central	74.1	25.8	
Maine	99.7	0.2	0.2	Kentucky	92.4	7.5	
New Hampshire	99.9	0.1		Tennessee	82.6	17.4	
Vermont	99.8	0.1		Alabama	65.2	34.7	
Massachusetts	98.7	1.3	0.1	Mississippi	50.7	49.2	0.1
Rhode Island	98.4	1.5	0.1	West South Central	81.0	18.6	0.5
Connecticut	98.0	1.9		Arkansas	75.2	24.8	
Middle Atlantic	95.3	4.6	0.1	Louisiana	64.0	35.9	0.1
New York	95.6	4.2	0.2	Oklahoma	90.1	7.2	2.7
New Jersey	94.3	5.5	0.1	Texas	85.6	14.4	
Pennsylvania	95.2	4.7		Mountain	95.9	0.9	3.2
East North Central	95.9	4.0	0.1	Montana	96.6	0.2	3.2
Ohio	95.0	4.9		Idaho	98.9	0.1	0.9
Indiana	96.5	3.6		Wyoming	98.4	0.4	1.3
Illinois	95.0	4.9	0.1	Colorado	98.5	1.1	0.4
Michigan	95.9	4.0	0.2	New Mexico	92.6	0.9	6.5
Wisconsin	99.2	0.4	0.4	Arizona	85.5	3.0	11.5
West North Central	96.0	2.6	0.4	Utah	98.7	0.2	1.1
Minnesota	99.2	0.4	0.5	Nevada	94.3	0.6	5.0
Iowa	99.3	0.7		Pacific	96.2	1.4	2.3
Missouri	93.5	6.5		Washington	97.8	0.4	1.8
North Dakota	98.4		1.6	Oregon	98.7	0.2	1.0
South Dakota	96.3	0.1	3.6	California	95.5	1.8	2.7
Nebraska	98.6	1.1	0.3				
Kansas	96.4	3.6	0.1				
South Atlantic	83.4	26.4	0.2				
Delaware	86.5	13.5					
Maryland	83.4	16.6					
District of Columbia	71.5	28.2	0.2				
Virginia	75.3	24.7					
West Virginia	93.8	6.2					
North Carolina	71.9	27.5	0.6				
South Carolina	57.1	42.9	0.1				
Georgia	65.3	37.7					
Florida	72.9	27.1	0.1				

*16th Federal Census, Vol. 3, Population.

Differences in dentist : population ratios can also be in part explained in terms of racial composition of the population of the various regions. That it may be of considerable significance in some areas is readily apparent from a study of Table 4. While dentist : population ratios are doubtless influenced by the Chinese and Indian population of the Pacific and the Southwest, the effect arising from the high negro population of the southern areas is outstanding. Negroes constitute 26.4 per cent of the population of the South Atlantic, 25.8 of the population of the East South Central and 18.6 of the West South Central.

It is frequently contended that comparison of the white dentist : white population ratios of the North and South would show that the southern whites are quite as well supplied with dentists as the northern. Table 5 shows that this is not the case, and that the white population per white dentist is greater than in any other geographic district. Again the difference in income of the white population of the various regions doubtless plays an important rôle. On the other hand, there is some reason for suspecting that there are regional differences in the need for dental personnel on the part of the white population or in fact on the part of the population as a whole.

Table 5 also shows that the dental service available to the negro population (9,651,908) of the three southern areas is of very little significance. But little dental care is provided the negro population by the white dentists of these areas, and this is due largely to the social and economic status of the negro. Inasmuch as these three areas have but 703 active negro dentists, any small amounts of service which may be rendered by white dentists will not alter appreciably the fact that the negro population of the South has practically no dental service available.

Study of the age composition of the population of the various geographic districts (Table 6) shows that the Pacific areas and all of the northern geographic districts have a greater proportion of persons over 35 and 55 years than have the mountain or southern areas.

The difference in the proportion of the population over 35 and over 55 years may reflect a difference in the accumulated effects of dental caries, dietary deficiencies and systemic disease. This may be significant for the reason that the older the population, the greater the potential prevalence of periodontal disease, and the partial or complete loss of teeth. It may be assumed that this would in turn call for more units of dental service, especially in view of the fact that the areas having the highest proportion of

Table 5.—Approximate Gross Dentist : Population Ratio Compared with White Dentist: White Population Ratio and Negro Dentist : Negro Population Ratio in Three Geographic Districts, 1940*

	Gross Dentist: Population Ratio	White Dentist: White Population Ratio	Negro Dentist: Negro Population Ratio
South Atlantic	1 : 3,001	1 : 2,367	1 : 11,812
East South Central	1 : 4,780	1 : 3,188	1 : 18,057
West South Central	1 : 3,320	1 : 2,800	1 : 14,056

*Data from 16th Federal Census.

Table 6.—Percentage of Population 35 and and Over and 55 and Over, by Geographic Districts*

	Average 35 and Over	Average 55 and Over
New England	43.9	17.6
Middle Atlantic	43.4	15.3
East North Central	42.8	16.1
West North Central	41.4	16.4
South Atlantic	36.5	12.7
East South Central	32.1	12.0
West South Central	34.8	12.1
Mountain	37.3	13.4
Pacific	46.0	18.1

*Federal Census, 1940.

persons of 35 and 55 years also have the highest per capita incomes. It does not appear sound to assume that the needs created by an older population in the North are offset by the existence of a greater proportion of children in the southern districts. Treatment of the accumulated effects of dental caries and of periodontal disease, and the general dental rehabilitation required in an older population, are more time-consuming than is dental care for children.

In view of the interest in dentistry for children, it was considered desirable to determine the ratio of dentists to the child population in the ages 2 to 14 years inclusive, by geographic districts, as shown in Table 7. Inasmuch as the Census grouping of children in the lower ages includes those "under 5 years," it was necessary to determine the approximate number of children from 2 to 4 years of age inclusive, first by subtracting from this group all of those enumerated as being under 1 year; second, by subtracting the estimated number of children 1 year of age, this estimate having been calculated by dividing by four the number of children ages 1 to 4 inclusive.

In support of the assumption that the number of children 1 year of age equals approximately one-fourth of the number of children aged 1 to 4 inclusive, it may be pointed out that unless significant differences in birth and death rates had occurred for these age groups, the number of children for each year of life after the first year would remain relatively constant, and that in view of the comparatively low death rates for children of ages 1 to 4 inclusive, there would be approximately the same number of children at each of the four year-levels.

As can be determined from Table 7, children in the ages 2 to 4 inclusive constitute approximately one-fifth of the population per dentist for all ages except in the East South Central area, where the proportion reaches 43 per cent. However, it should be pointed out that in the three southern districts, white children from 2 to 14 years make up approximately 26 per cent of the white dentist: white population ratio.

It is evident that the number of children from 2 to 14 years bears a close relationship to the total population per dentist. It is also clear that dental personnel is much less available to white children in the South Atlantic and East and West South Central areas than in any other regions.

TABLE 7.—ESTIMATED RATIO OF WHITE DENTISTS TO CHILDREN OF WHITE AND "OTHER RACES,"* 2 TO 14 YEARS, AND OF NEGRO DENTISTS TO NEGRO CHILDREN, 2 TO 14 YEARS, BY GEOGRAPHIC DISTRICTS, 1940†

	Ratio of White Dentists to Children of White and "Other Races"	Ratio of Negro Dentists to Negro Children	Gross Dentist: Child Population Ratio	Dentist: Population Ratio, All Ages
New England	1 : 354	1 : 46	1 : 353	1 : 1,674
Middle Atlantic	1 : 272	1 : 1,196	1 : 282	1 : 1,457
East North Central	1 : 323	1 : 818	1 : 332	1 : 1,630
West North Central	1 : 337	1 : 1,058	1 : 342	1 : 1,591
South Atlantic	1 : 614	1 : 2,582	1 : 812	1 : 3,001
East South Central	1 : 863	1 : 5,193	1 : 1,100	1 : 4,780
West South Central	1 : 704	1 : 3,659	1 : 839	1 : 3,320
Mountain	1 : 531	1 : 944	1 : 532	1 : 2,171
Pacific	1 : 224	1 : 572	1 : 226	1 : 1,290

*"Other Races" applies to non-white other than negroes, as enumerated in the Federal Census, 1940.
†Base figures for all computations derived from Federal Census, 1940.

In some geographic districts, service is rendered to negro children by white dentists. This is very rare in the three southern areas; consequently, the number of these children per negro dentist would indicate that they receive but little, if any, professional dental care. There is the possibility that southern negro children aged 2 to 14 require somewhat less care than do southern white children of the same age. This possibility is to be seen in the studies of Blackerby,[1] Sebelius[2] and others. However, in view of the large number of negro children per negro dentist, the actual difference in need is not very likely to be of great significance.

It has frequently been suggested that there is an actual difference in the prevalence or the intensity of dental caries between the North and the South. This assumption appears to be reasonably well supported by analyses of the data of Public Health Bulletin 226.[3] Additional supporting evidence appears to exist in the National Selective Service rejections due to "defective and deficient" teeth. In the draft of 1918, the rejections per thousand men examined showed not only a marked difference between the North and the South, but also a considerable difference among the nine geographic districts. While rejection rates for dental conditions in connection with the draft which began in 1940-1941 are not yet available, it is understood that they follow much

TABLE 8.—PERCENTAGE CHANGE IN CIVILIAN POPULATION AND IN NUMBER OF ACTIVE DENTISTS, APRIL 1, 1940-JANUARY 31, 1944

	Change in Civilian Population*	Change in Civilian Dentists†		Change in Civilian Population	Change in Civilian Dentists
Alabama	— 3.9	—23.6	Nebraska	—10.5	—30.0
Arizona	+14.5	—30.5	Nevada	+20.1	—38.1
Arkansas	—10.9	—24.2	New Hampshire	— 7.7	—22.3
California	+14.8	—28.9	New Jersey	— 1.8	—25.1
Colorado	— 4.7	—26.1	New Mexico	— 7.6	—34.1
Connecticut	+ 2.4	—30.8	New York	— 7.4	—30.0
Delaware	+ 3.1	—22.8	North Carolina	— 6.1	—15.7
Dist. of Columbia	+24.2	—23.7	North Dakota	—16.4	—27.1
Florida	+ 6.4	—24.8	Ohio	— 1.1	—25.2
Georgia	— 4.1	—22.3	Oklahoma	—14.7	—23.9
Idaho	— 9.8	—22.3	Oregon	+ 7.8	—26.4
Illinois	— 4.2	—29.4	Pennsylvania	— 6.8	—29.8
Indiana	— 1.2	—25.0	Rhode Island	— 2.0	—26.7
Iowa	—10.3	—28.8	South Carolina	— 5.4	—18.8
Kansas	— 6.5	—14.1	South Dakota	—15.2	—22.4
Kentucky	—10.1	—24.0	Tennessee	— 3.3	—29.8
Louisiana	— 1.8	—29.6	Texas	— 1.9	—24.4
Maine	— 7.3	—20.6	Utah	+ 6.2	—20.9
Maryland	+ 9.8	—16.6	Vermont	—11.5	—26.5
Massachusetts	— 5.1	—18.4	Virginia	+ 4.8	—22.0
Michigan	+ 2.4	—24.5	Washington	+10.8	—25.8
Minnesota	— 9.4	—26.6	West Virginia	— 8.9	—21.6
Mississippi	— 8.6	—25.0	Wisconsin	— 6.1	—24.5
Missouri	— 6.8	—22.1	Wyoming	— 3.7	—15.3
Montana	—15.8	—25.6			

*Includes consideration of births, deaths and withdrawals to armed forces. Bureau of the Census, Series P-44, No. 3; February 15, 1944.

†Includes consideration of withdrawals to armed services, deaths and retirements among remaining dentists, and additions. Base figure, 1940 Census Enumeration of Dentists.

the same trend. So far as these findings are related to the intensity of dental caries, the difference, especially between high and low income states or districts, may be even more marked than is indicated by the rejection rates. In the low income states and districts, it is probable that there were more dental deficiencies among men of draft age because of the tendency to resort to removal rather than to attempt conservation of teeth. This tendency would obviously be more manifest in areas of low income and low educational composition, and where dental service is not readily available. It is not the intention here to arrive at conclusions regarding the suggested difference in caries incidence among different areas, or in regard to the factors which are often assumed to exist. There is still great need for more sound epidemiologic data before definite conclusions can be reached. Nevertheless, it would seem that eventually serious consideration should be given to wide geographic variations in climate, the fluorine content of water supplies, food habits and perhaps a number of other conditions.

It is frequently suggested that the wide variation in dentist: population ratios among the various states and geographic districts is indicative of an improper distribution of dentists throughout the United States. However, the fact that the Pacific region has more dentists than does the West South Central does not mean that the Pacific area is oversupplied. Rather, it means that the West South Central region has a greater deficiency in number of dentists. Heavy concentration of dentists in metropolitan areas may cause improper distribution within a state; yet because of modern methods of transportation, the effects of this concentration are less pronounced than they were in former years.

It is clear that while there is not an oversupply of dental personnel in any state or geographic district, the need for additional dental personnel is greater in the southern areas, and in these areas there appears to be a pointed need for negro dentists. In consideration of the economic and educational composition of the population of these southern areas as a whole, to increase the number of dentists per unit of population appears difficult. It may be pertinent here to suggest

TABLE 9.—PERCENTAGE CHANGE IN CIVILIAN POPULATION AND IN NUMBER OF ACTIVE DENTISTS, APRIL 1, 1940-JANUARY 31, 1944, BY GEOGRAPHIC DISTRICTS

	Civilian Population November 1, 1944*	Change in Civilian Population Since April 1, 1940 Per Cent*	Active Dentists April 1940†	Active Civilian Dentists January 31, 1944‡	Change in Active Civilian Dentists Per Cent
New England	8,087,809	— 4.0	5,038	3,906	—22.4
Middle Atlantic	25,796,511	— 6.0	18,900	13,272	—29.7
East North Central	26,098,118	— 1.9	16,327	11,966	—26.7
West North Central	12,263,345	— 9.2	8,493	6,291	—25.8
South Atlantic	17,701,066	— 0.1	5,606	4,455	—20.5
East South Central	10,081,940	— 6.3	2,664	2,153	—19.1
West South Central	12,299,770	— 5.5	3,934	2,936	—25.3
Mountain	4,019,718	— 2.7	1,911	1,426	—25.3
Pacific	10,959,607	+13.3	7,544	5,428	—28.0
	127,307,884		70,417	51,883	
—4,021,220 since April 1, 1940		Dentist: Population ratio January 31, 1944, 1 : 2,453.			

*Bureau of the Census, Series P-44, No. 3, February 15, 1944.

†16th Bureau of the Census, 1940, Occupations.

‡Includes consideration of withdrawals to armed services, deaths, retirements and additions.

that all geographic areas be carefully studied for the purpose of determining whether significant variations exist in the need for dental personnel.

II

The second phase of this discussion deals with the change in the civilian population and in the number of active civilian dentists due to the war. It is extremely difficult to secure reliable data as a basis for computing the changes which have occurred. It is assumed that the records of licensing boards include the names of many dentists who, although retired, maintain their license to practice. In other cases, dentists are registered in more than one state, and it is not clear from the records just where they are located. There is also among civilian dentists the rather current and significant fact of migration—and the lack of information regarding the location of recent graduates who have not entered the armed services.

For the purpose of arriving at reasonably approximate conclusions regarding the changes which have occurred in each state and geographic district, the enumeration by state of the Federal Census, April 1940, was taken as a base. From this enumeration was deducted the number of dentists who had entered the armed service up to January 31, 1944, as shown in data received from the liaison officer assigned to work with the War Service Committee of the American Dental Association. For the reason that there was no reliable information regarding the location of the graduates from June 1940 through 1943, it was assumed that all of the graduates except 15 per cent had entered the armed services. It was further assumed that this 15 per cent would for the most part locate in the states which they had given as their residence. Consequently, a number representing a state's average annual percentage of the whole number of dental students enrolled in dental schools for 1940-1941-1942-1943 was added to the total number of dentists remaining in civilian practice. A combined death and retirement rate of 20 per thousand was used for 1940, 1941 and 1942, and a rate of 30 per thousand for 1943. The rate of 30 per thousand for 1943 was based on the assumption that because of the age composition of remaining dentists, the rate would be higher than under normal conditions. However, this rate is slightly below that of 31.3, which was estimated by the National Institute of Health.[4]

A comparison of the change in the civilian population and in the number

TABLE 10.—NUMBER OF GRADUATES AND ESTIMATED NUMBER OF ACTIVE DENTISTS, JULY 1940 to EARLY 1946

	Graduates	Active Dentists (Mortality and Retirement) 24 per 1,000	Estimated Dentist: Population Ratio	Active Dentists (Mortality and Retirement) 20 per 1,000	Estimated Dentist: Population Ratio
1940 (April)		70,417	1 : 1,855	70,417	
1940 (July)	1,757*	71,883		71,966	
1941	1,568*	71,731		72,095	
1942	1,784*	71,794		72,348	
1943	1,926*	71,997		72,916	
1944	3,800†‡	74,070		75,258	
1945	2,270†	74,563	1 : 1,877	76,023	1 : 1,857
1946	2,152†	74,926		76,665	

*Dental Students Register, Council on Dental Education.
†Estimates based on existing enrollment.
‡Most of late 1943 seniors graduated in 1944.

A comparison of the change in the civilian population and in the number

of active dentists is shown in Tables 8 and 9. It will be noted that in a number of states in which the civilian population has increased, there is a substantial deficit in the number of civilian dentists, this being especially true of California, Oregon and Washington. The estimated number of active dentists as of January 31, 1944, corresponds rather closely to the number estimated by the Committee on Dentistry of the Procurement and Assignment Service as the number (51,874) necessary to maintain a dentist: population ratio of 1:2,500 as of December 31, 1943. However, the latter estimate was made in terms of a larger armed service procurement figure, and an estimated population at that time of 125,625,000 instead of 127,307,884. It is probable that the national ratio of 1:2,453, estimated for January 31, 1944, was fairly representative of the true situation. Since that time, the ratio has probably risen somewhat beyond 1:2,500. There has also doubtless been some change in the distribution of both dentists and population.

If the war continues or if there is a large naval force and an army of occupation after the war, the situation regarding civilian dental personnel may reach even more serious proportions. The intensity of practice and each yearly advance in age will increase the death and retirement rate among the older dentists remaining to serve the civilian population. It is not unlikely that the remaining dentist: civilian population may reach a ratio of 1:3,000. However, much depends on the number of forthcoming graduates commissioned by the Army and the Navy, and also upon the number of dental officers who may be returned to civilian practice. A number of schools have already been notified that their graduates of this year will not be commissioned and will be available for civilian practice.

TABLE 11.—ESTIMATED NUMBER OF ACTIVE DENTISTS, 1946-1947-1948, BASED ON DECREASES IN AVERAGE NUMBER OF GRADUATES, BEGINNING IN 1946

		If Average Number of Graduates Is Reduced 25 Per Cent*		If Average Number of Graduates Is Reduced 33⅓ Per Cent		If Average Number of Graduates Is Reduced 50 Per Cent	
		Graduates	Active Dentists	Graduates	Active Dentists	Graduates	Active Dentists
If mortality and retirement rate is 24 per 1,000	1946-1947	2,864†	74,382	2,544	74,144	1,910	73,671
	1948	1,432	73,855	1,272	73,386	955	71,500
		Active dentist decrease 1945-1948, 708		Active dentist decrease 1945-1948, 1,177		Active dentist decrease 1945-1948, 3,063	
If mortality and retirement rate is 20 per 1,000	1946-1947	2,864	74,817	2,544	74,239	1,910	74,117
	1948	1,432	74,722	1,272	74,261	955	73,229
		Active dentist decrease 1945-1948, 1,301		Active dentist decrease 1945-1948, 1,762		Active dentist decrease 1945-1948, 2,794	

*Base figure, the average annual number of graduates during the period 1940-1946 inclusive.
†Graduates of late 1946 and of 1947, combined because of overlapping in dates of graduation.

III

It is obvious that estimates regarding the current and future dentist: population ratios must be based on the annual deaths and retirements in the dental profession, the number of additions and the growth of population.

The combined annual death and retirement rate in the dental profession was estimated by O'Rourke and Miner[5] to be 24 per thousand. Dorn[6] (1943) esti-

mated that the crude death rate among male dentists enumerated in the sixteenth census was 13 per thousand, and expressed the opinion that while the retirement rate cannot be determined with accuracy, it probably is not more than 7 per thousand per annum. Dorn's estimates would therefore give a combined death and retirement rate of 20 per thousand. It is probable that either of these rates will very closely approximate the actual situation.

Table 10 shows the estimated number of dentists from July 1940 through the first half of 1946. Estimates are based on the actual number of graduates and the number who may be expected to graduate in 1944, 1945 and 1946, this number representing the original class enrollment minus a total loss of 16 per cent for each class throughout the four academic years. The combined death and retirement rates of 20 and 24 per thousand are used. In computing the 1945 ratios, it was assumed that the population would be 138,000,000. It is evident that the two extra classes from 1940 to early 1946 have accounted for approximately 3,900 additional graduates. It is also clear that if the population does not exceed 138,000,000, the dentist: population ratio in 1945 will approximate that of April 1940.

There are several reasons that estimates regarding the number of graduates from late 1946 to 1948 must be highly speculative. These include changes in National Selective Service policies relative to the deferment of predental students, reduction in enrollment under the Army Specialized Training Program and the decrease in number of young men of college age arising from the period of declining birth rates which extended from 1921 to 1940. In the future, much will depend on the length and course of the war, and on the number of high school students who enter college. However, a sharp reduction in the first year classes of late 1944 and 1945 appears to be inevitable. This in turn will be reflected in a decrease in the number of graduates of late 1946 and for 1947 and 1948.

Table 11 indicates the estimated number of graduates for 1946-1947-1948, based on assumptions that the decline in the enrollment of first year students of late 1944 and of 1945 may be such as to

TABLE 12.—FUTURE POPULATION ACCORDING TO CERTAIN ASSUMED TRENDS OF NET IMMIGRATION, SPECIFIC BIRTH RATES, AND EXPECTATION OF LIFE, UNITED STATES, 1940 TO 1950*

Year	A Medium Fertility and Mortality and No Net Migration of Foreign Born	B Same as A with Net Immigration of 100,000 Annually After 1940	C Low Fertility, High Mortality, and No Net Migration of Foreign Born	D Low Fertility, Medium Mortality, and No Net Migration of Foreign Born	E High Fertility, Low Mortality, with Net Immigration of 200,000 Annually After 1940	F Same as E and No Net Migration of Foreign Born
	Future Population (Thousands)					
1940†	132,630	132,629	131,749	131,902	133,282	133,282
1945	137,096	137,607	134,712	135,163	139,938	138,916
1950	141,213	142,301	136,725	137,636	146,829	144,627

*These estimates were made by Scripps Foundation for the National Resources Committee, "Population Statistics, National Data," Government Printing Office, Washington, D. C., 1937. The assumptions used are set forth in detail in this publication.

†Census population in 1940, 131,669,000.

reduce the number of graduates 25 per cent, 33⅓ per cent or 50 per cent of the average annual number of graduates from 1940 to early 1946. The estimated number of active dentists, based on the probable number of additions to the profession, is tabulated separately in terms of combined annual death and retirement rates of 20 and of 24 per thousand. Computations are made on a peacetime basis. However, it appears that the combined death and retirement rates for all dentists will exceed those used here.

It is evident that if the reduction in number of graduates in late 1946 and in 1947 and 1948 is but 25 per cent, a sharp rise in the population per dentist will occur. It is of course difficult to determine what the population will be in 1948. Estimates of the civilian population based on the registration for War Ration Book 4[7] indicate that the population as of November 1, 1943 was 127,307,884. Taking into consideration the number of both sexes in the armed forces, this would mean a total population of approximately 137,500,000 at that time. This would exceed the estimates made by the Scripps Foundation in 1937, which are for the decade 1940 to 1950. It is clear that if the population trends of 1942 and 1943 continue, the population increase would approach those under assumption E in Table 12. However, this is not very likely to be so. A probable decline in the birth rate as an increasing number of men leave the country, military losses and other conditions may reduce the rate of population increase considerably. Therefore, estimates regarding the 1948 or the 1950 population must be made on a highly speculative basis. Nevertheless, in terms of an annual average population increase as low as 0.43 for the period 1940 to 1948 (column D), the population per dentist would increase slightly if, at the same time, there was a 25 per cent decrease in the number of graduates from late 1946 through 1948. If an annual average rate of increase of 0.73 holds (column B), the population per dentist will under the same conditions rise rather sharply and approach rather closely a national ratio of 1 : 2,000.

It may be worth while to speculate on the probable change that might result through utilization of all available places in the dental schools of the United States. Estimates regarding the total number of places available to first year dental students range from 2,800 to 3,300. Assuming that 3,300 places are available, and that those who survive the first two years could be accommodated in the clinical years, approximately 2,400 graduates would be produced. It is evident that 3,300 first year students cannot be expected in 1944. However, to be conservative, it may be well to assume such an enrollment beginning in 1945.

It is estimated that, in early 1946, there will be 74,926 active dentists in the United States. Allowing for deaths and retirements at the rate of 24 per thousand dentists, and assuming that the graduates of late 1946 would be 1,909, a figure which represents the average number per year from 1940 to early 1946, there will be 75,037 active dentists in 1947. Assuming an enrollment of 3,300 first year students in 1945, discontinuance of the accelerated program and the addition of 2,400 graduates each year, there would be approximately 76,793 dentists in 1950. This estimate does not take into account the probable delay in graduation which may be caused by transition from the accelerated program to the non-accelerated program. However, the establishment of some transition device may operate to reduce this delay.

Warren S. Thompson and P. K. Whelpton,[8] of the Scripps Foundation, in 1938 estimated for the National Resources Planning Board that, on the basis of medium mortality, medium fertility and no net annual immigration after 1940, the population in 1950 would be 140,561,000. There are reasons for be-

lieving that the population will exceed this estimate, which was made in 1938. On the basis of population estimates by the Bureau of the Census, and the existence of 76,793 active dentists, the dentist : population ratio in 1950 would be approximately 1 : 1,830, or roughly that of 1940. If the accelerated program is continued beyond 1945, the number of persons per dentist will be slightly less. On the other hand, if the population in 1950 exceeds 140,561,000, and this is very likely to be the case, the population per dentist will go beyond that of 1940. Thus, despite operation of dental schools at their maximum capacity, beginning in 1945, it is not very likely that there will be any significant reduction in the population per dentist by 1950. If operation at full capacity is continued into the next decade, when it is estimated that there will be a substantial decline in the rate of population growth, the situation would obviously improve.

The significance of present or future national dentist : population ratios, or those of states or geographic districts, cannot be derived from simple numerical comparisons with those of any previous year, for these ratios have their full meaning only at the time at which they exist. As the body of knowledge in the field of dentistry expands, there is, or should be, a corresponding expansion of the field of public dental service and in dental need—need for the application of this knowledge to the problems of prevention, control or treatment. Knowledge in the field of dentistry and interest in dental health have increased greatly in recent years, and there are good reasons for believing that this will continue at an increasingly accelerated rate. Therefore, a dentist : population ratio for 1945 or for 1948 or 1950 in which the population per dentist equals or exceeds that of 1940 can mean only that the personnel resources of the dental profession have become less adequate. This situation will apparently hold for each state and each geographic district despite the 1940 distribution of dentists or the distribution which, in the light of existing trends, may be anticipated in the postwar period.

Consideration of future regional dentist : population ratios should include the probable effects of internal migration on the distribution of population. In the decade 1930 to 1940, the area north of the Ohio, and east of the Mississippi which had previously shown rapid growth, had a rate of population increase less than that of the country as a whole. This was due to a slowing of immigration from foreign countries and to unfavorable conditions in industry which retarded the flow of population from other areas. In the Southeast, an area which in the past has exported so much of its population to the North and the West, the usual exodus almost ceased. Because of its high birth rate and the decline in migration, this region in the last decade gained population at a rate considerably beyond that of the nation. The greatest regional increase in population was in the West, and in this gain is reflected an increased flow of older persons from all regions, and more especially migration from the so-called "dust bowl" area.

The migration accompanying rapid expansion of war industries was cause for further marked changes in population distribution. It is impossible to determine the permanency of these changes. It is also impossible to predict whether there will be a return to the migration trends of the predepression period. Because of its probable greater industrialization, the Southeast may not in the future export so much of its population as it has in the past. However, assuming that immigration from foreign countries will not be significant, the Northeast will, under favorable conditions in industry, doubtless continue to draw some population from the Southeast. It has been suggested that the plains regions will regain some if not

all of their population losses, while the West will continue to show substantial increases, importing as it has always done a higher proportion of population than any other region. Thus there may be, in the postwar period, decided shifts in population distribution, and these may alter considerably the dentist: population ratios of the early 1940's.

BIBLIOGRAPHY

1. BLACKERBY, P. E., Jr.: Comparative Analysis of Dental Conditions Among White and Negro Children of Rural and Semirural Communities. J.A.D.A., 26:1574, September 1939.

2. SEBELIUS, CARL L.: Variations in Dental Caries Rates Among White and Negro Children. J.A.D.A., 31:544, April 1, 1944.

3. Public Health Bull. No. 226, U. S. Public Health Service, Washington, D. C., May 1936.

4. Statement Regarding the Availability and Allocation of Dentists. Committee on Dentistry, Procurement and Assignment Service, February 20, 1943.

5. O'ROURKE, J. T., and MINER, L. M. S.: Dental Education in the United States. Philadelphia: W. B. Saunders Co., 1941, p. 315.

6. DORN, H. F.: Death and Retirement Rate of Dentists. Unpublished data, February 1943.

7. Bureau of the Census, Series P-44, No. 3, February 15, 1944.

8. Problems of a Changing Population. National Resources Planning Board, 1938, p. 24.

LEIOMYOSARCOMA OF THE MANDIBLE: REPORT OF CASE

T. E. CARMODY,* M.D., D.D.Sc., D.D.S.; H. M. JANNEY,† M.D., and HAROLD A. L. HUSESMAN,‡ D.D.S., Englewood, Colo.

A REVIEW of the literature[1, 2, 3, 4] shows that leiomyosarcoma is apparently extremely rare. No report can be found of its occurrence in the mandible. Thoma[2] speaks of eight reported cases of leiomyoma involving the mouth, tongue and gingiva, but nothing has been said of a leiomyosarcoma occurring in the mandible. Carmody[4] says "Osteogenetic sarcomas are the main group of primary malignant tumors of the jaw, but they are still rare." A leiomyosarcoma may be defined as a sarcoma formed from the mesenchymal cells forming smooth muscle, generally from cell rests.

REPORT OF CASE

History.—May 17, 1942, a white boy aged 18 years reported to the dental clinic with a slight swelling on the left body of the mandible. This swelling was moderately firm with no pain or signs of inflammation present. No paresthesia was present in the lower lip. The patient was not conscious of its presence until it was called to his attention by a friend.

Examination.—Small lateral and occlusal x-ray plates of the swelling revealed a well-defined outline of a rarefied area extending from the mesial aspect of the second bicuspid to the distal aspect of the second molar, and from the inferior border of the mandible almost to the cervices of the teeth. The buccal bony plate had been pushed externally about one-fourth inch. Superposition of the teeth over the involved area in the occlusal x-ray film made it impossible to determine whether the cavity involved the roots of the teeth. Palpation of the regional lymph nodes was negative and the patient was otherwise in good physical condition.

Operation.—The first diagnosis was dentoperiosteal cyst and, May 21, operative procedures were undertaken for its removal. An incision was made in the mucobuccal fold of the mouth, and the tumorous contents, consisting of a white fatty-like globular substance, were completely enucleated. No cystic fluid was present. The postoperative history was uneventful. It is interesting to

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note that the cavity did not involve the roots of the teeth, but was laterally from them.

Laboratory Data.—In the meantime, histopathologic studies of the removed tissue were made and reported from two sources. One report stated that "the specimen shows marked autolysis with very poor cellular detail so that no definite diagnosis can be given." (National Institute of Health, U. S. Public Health Service.) The other report considered two conditions: "A giant cell tumor and a periosteal fibrosarcoma. The latter is favored and it seems to be of low malignancy and vitality . . ." (Fitzsimmons General Hospital, Col. Hugh Mahon.)

Consultation.—Owing to some doubt as to a definite diagnosis, consultation with a roentgenologist was sought. It was advised that the subject be placed under close observation and have diagnostic x-ray studies at frequent intervals.

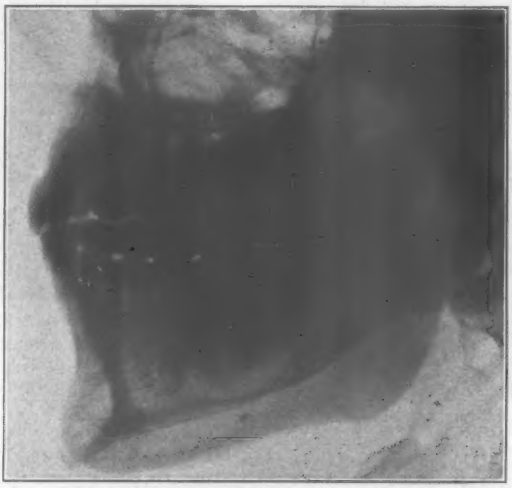

Fig. 1.—Roentgenogram of left side of mandible.

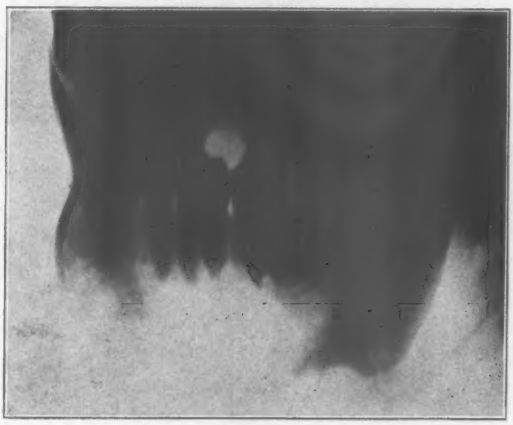

Fig. 2.—Anterior posterior roentgenogram before surgery.

Course.—June 9, the patient was readmitted to the hospital because of slight recurrent swelling on the mandible. After

apparently showing local improvement, he was discharged from the hospital, June 20.

The series of x-ray pictures that were finally taken showed definite and extended rarefaction of the mandible, with an irregularly outlined cavity. (Figs. 1 and 2.) Clinically, the swelling of the mandible gradually increased, but it was not painful at any time. (Fig. 3.) Owing to the salient features displayed clinically, roentgenographically and pathologically by the growth, such as recurrence and progressive bone absorption, a diagnosis of "probable sarcoma" was made.

Fig. 3.—Photograph of patient showing swelling of left side of mandible.

Fig. 4.—Left mandible removed (including tumor).

Fig. 5.—Lateral and front view of patient after surgery. Teeth not shown in this photograph because lips are not separated, but the teeth were in perfect occlusion, although only the right side of mandible was retained.

It was agreed that a radical surgical operation was the indicated means for a cure. Chest x-ray pictures gave no evidence of metastatic lesions, and the subject was otherwise still in good general health.

Second Operation.—August 27, the left half of the mandible was removed by one of us (T. E. C.). The mandible was skeletonized and disarticulated at the glenoid fossa and cut through at the symphysis with a Gigli saw. (Fig. 4.) The wound was filled with sulfanilamide crystals (4 gm.) and the wound closed, a large gauze packing remaining in the glenoid cavity and extending downward between the muscle layers.

Postoperative Course.—Convalescence was stormy. Early diabetic coma (the patient had had no glycosuria on repeated preoperative examinations) was controlled by large doses of insulin and the usual procedures. On the fourteenth day, a severe and persistent hemorrhage developed through the mouth at the upper end of the wound, necessitating emergency ligation of the external carotid artery. (By T. E. C.) After repeated transfusions, the patient rallied. Recovery was slow, but uneventful thereafter. The teeth on the right side remained in perfect occlusion, and at the time of discharge from the institution, the patient was able to masticate a normal diet. It was not necessary to wire the teeth on the right side to maintain occlusion. Instead, the patient was instructed to exert a conscious effort in occluding the teeth until the musculature of the mandible had adapted itself to the discrepancy. As can be seen from Figure 5, the esthetic result was good.

Before and for six months after the operation, x-ray pictures of the chest were taken periodically in consideration of possible metastases, but all proved negative. The prognosis is quite obviously uncertain. Six months after the operation, the patient was apparently in good health and presented no symptoms of recurrent trouble. He was released from the institution to return to his home and subsequent follow-up attempts have been unsuccessful.

Final Microscopic Report.—Diagnosis of "leiomyosarcoma." The tumor is formed of diffusely disposed, medium-size to large, spindle-shaped cells separated by minimum amounts (in areas more) of collagen fibers. Not infrequently, the cells are arranged in interlacing fasciculi. Tumor cells generally have fairly long tapering extremities, ample lightly oxyphilic cytoplasm and deeply stained nuclei and large nucleoli. The nuclear chromatin is distributed, usually in medium sized granules. In addition, there are tumor giant cells with lobate or multiple nuclei. In some of these instances, the giant cells are of enormous size and often appear straplike. In the cytoplasm of some cells, particularly at their extremities, fibrils staining blue with phosphotungstic hematoxylin stain are seen, suggesting myofibrillae. Cross striations could not be identified. Mitoses, many atypical, are numerous. One side of the tumor is bordered by cancellous bone. At the periphery of the tumor, the collagenous connective tissue is condensed, forming a pseudocapsule. Histologically, it is impossible to tell whether this tumor had an extramandibular or intramandibular origin. (National Institute of Health, U. S. Public Health Service.)

Comment.—Although the initial x-ray film uggested a dentoperiosteal cyst, this diagnosis was ruled out since the dental roots were not in contact with the bone cavity.

It is interesting to note that the lower left third molar was absent in this case, and history of its extraction was negative. In diagnosis, differentiation of an adamantinoma from a sarcoma, in this case, was confusing. Congenital absence of a lower third molar, the tumor site, bulging of the facial contour and the roentgenographic findings were all suggestive of an adamantinoma. Roentgenographically, it has been demonstrated by Blair *et al.* that "a delicate point of differentiation is that the layer of bone immediately enclosing a cyst adamantinoma in the body or ramus usually shows a thin layer of increased density similar to that bordering a tooth socket." Histopathologic reports have eliminated this diagnosis.

BIBLIOGRAPHY

1. EWING, JAMES: Neoplastic Diseases. Philadelphia: W. B. Saunders Co., 1940.

2. THOMA, K. H.: Oral Pathology. St. Louis: C. V. Mosby Co., 1940.

3. MEAD, S. V.: Oral Surgery. St. Louis: C. V. Mosby Co., 1940.

4. CARMODY, T. E.: Tumors of Jaws. *Tr. Am. Laryng. A.*, 61:29, 1940.

5. BLAIR, V. P.; MOORE, SHERWOOD and BYARS, L. T.: Cancer of Face and Mouth. St. Louis: C. V. Mosby Co., 1941.

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AUGUST 1 *Editorial Department* 1944

FUTURE DENTAL MANPOWER

IN the July issue, we commented editorially on the frustration of the dental educational program inaugurated by the Army in July 1943, a program designed to assure a continuing supply of physicians and dentists to the armed forces of the nation. At that time, we presented the proposal by the conference committee representing the Association of Dental Schools, the Council on Dental Education and the Ad Interim Committee of the American Dental Association, to the effect that the War and Navy Departments permit 2,000 qualified young men now in the armed forces to enter dental schools or to complete their predental training in 1945. Thus far, no action has been taken by the Selective Service System to avoid the inevitable disturbance of the educational program that must follow application of the ruling.

The medical profession, being involved to an even greater degree by the purposed abandonment of the medical and dental educational program, proposed through the American Association of Medical Schools a similar procedure to that suggested by the Dental Conference Committee, but there is still no sign of relief from the impending calamity. The medical profession and the dental profession are therefore

turning to legislative action, with the result that both professions are offering full support to the Miller Bill (H.R. 5128), which reads:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that section 5 of the Selective Training and Service Act of 1940, as amended, is amended by inserting at the end thereof a new subsection reading as follows:

"(n) There shall be deferred from training and service under this Act in the land and naval forces of the United States, as necessary to the maintenance of the national health, safety, and interest, in each calendar year not less than six thousand medical students and not less than four thousand dental students. As used in this subsection the term 'medical or dental student' means (1) a person who is enrolled in, and who is pursuing a course of instruction prescribed for the degree of doctor of medicine at an accredited medical college; and a person who is enrolled in, and who is pursuing a course of instruction prescribed for the degree of doctor of dentistry at an accredited dental college; or (2) a person who is pursuing a regular course of instruction at an accredited college or university (satisfactory completion of which will make such person eligible for enrollment in an accredited medical or dental college) with the bona fide intention of entering an accredited medical or dental college and pursuing and completing the course of instruction prescribed for the degree of doctor of medicine or for the degree of doctor of dentistry."

Full and hearty support of the Miller Bill by the entire profession should be forthcoming.

At the suggestion of the Council on Dental Education, and as factual data in support of the contention that efficiency of the dental health service of the nation may be seriously crippled by the shortage of dental manpower threatened by the abandonment of the Army Specialized Training Program, we are publishing in the present issue "An Analysis of the Number and Distribution of Active Dentists in the United States," by John T. O'Rourke, a member of the Council on Dental Education. In this analytical study of the available dental manpower to supply the dental health needs of the nation, Dr. O'Rourke shows very clearly that there is at present not sufficient dental manpower to care for the needs of the people, to say nothing of the increased deficiency that will be created by the action of the Selective Service System in curtailing the output of dentists. The statistical analysis offered will undoubtedly aid materially in considering ways and means of meeting and solving the many problems facing dentistry in the postwar period.

A rather surprising reaction to the situation from the members of the Dental Corps of the Army, and an aspect of the question that we did not consider of serious import at the moment, concerns the effect that interference with the continuous supply of dentists to the Army through the Army Program would have upon those, or some of

those, who are now in the service and are apparently anxious to be relieved of further Army duty.

It seems that a number of the volunteers for dental service around the age of 40 entered the service with the impression that they would be relieved within a few years by the product of the accelerated educational program. Now, however, they are apprehensive lest these young men being rejected by the Army will go into private practice and probably supplant them.

This, of course, is a purely personal consideration of the present problem and one that could not receive consideration by the profession in its patriotic effort to meet the demands of the Army for dental service. It is not our understanding that these young graduates who are not wanted by the Army will enter private practice—they will be absorbed by the Navy, the Veterans Administration and the United States Public Health Service; and while these avenues may not provide for all those to come in later classes, it is unlikely that many of the recent dental graduates will enter private practice, at least for some years to come. Postwar conditions and provision therefor will create new and even more serious problems in meeting the dental health needs of the nation; and there is abundant indication that need for dental health service will be greater after the war than it has ever been. Hence, the curtailment of the supply of dentists at this time becomes of serious concern.

ANNUAL MEETING TRANSFERRED TO CHICAGO

THE Annual Meeting of the House of Delegates of the American Dental Association, originally scheduled to be held at Omaha, October 9-11, has been transferred to Chicago, with new dates, October 16-18. The Stevens Hotel will be headquarters and the sessions of the House of Delegates will be held in the North Ball Room. Those who have made or applied for hotel accommodations in Omaha are advised to cancel them and make new reservations in Chicago.

The transfer was authorized by the Board of Trustees after a careful investigation revealed the seriousness of the transportation problem and the certainty that it would become even more acute by October. Chicago's transportation facilities are the best and most extensive in the

country and the transfer of the meeting to that city guarantees the delegates a minimum of inconvenience.

This important decision was not made without profound regret. The Local Arrangements Committee in Omaha, headed by Herbert E. King, chairman, has done an excellent preparatory job, assuring the Association local support and cooperation equaling any that has ever been received for an Annual Meeting. They deserve the sincere thanks and appreciation of all for the efficient manner in which they have discharged their arduous duties. The Board of Trustees felt, however, that it could not afford to stage the meeting except under the most favorable circumstances. With extensive plans completed for the meeting, Omaha's keen disappointment is understandable. It is matched, however, by the reluctance with which the decision was reached and we hope it will be accepted in the spirit which has always characterized our Nebraska friends in organized dentistry—the greatest good for the greatest number.

We need, and we know we shall have, their support in making this business meeting of the Association a successful one.

C. RAYMOND WELLS, *President.*

SPECIAL COMMITTEE REQUEST

THE Special Committee of the Board of Trustees, appointed to canvass the field for prospective candidates for the office of General Secretary of the American Dental Association, calls attention to the fact that August 15 is the deadline for receiving applications for this position.

Details of the requirements and qualifications will be found in the May 15 midmonthly issue of THE JOURNAL.

All applications, inquiries and suggestions should be sent to the chairman of the committee, C. J. Wright, 702 American State Bank Bldg., Lansing 68, Mich., before August 15.

ERRATUM

Through an unfortunate oversight in the printing office, pages 955 and 956 in the Editorial Section of the July 1, issue, became transposed. The pages of the Editorial Section should be read in the following sequence, 954, 956, 955, 957.

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WAR SERVICE COMMITTEE

CONGRATULATIONS TO THE MEMBERS OF THE DENTAL PROFESSION ON THEIR ALL-OUT DRIVE FOR THE FIFTH WAR LOAN!

THE WAR SERVICE COMMITTEE REQUESTS THAT EACH STATE MAKE ITS REPORT ON THE RESULTS OF THE FIFTH WAR LOAN DRIVE AS PROMPTLY AS POSSIBLE SO THAT THE INFORMATION MAY BE TABULATED.

FOLLOWING are a few of the outstanding reports from states on the Fifth War Loan Drive:

Dear Doctor:

IT is a great deal of pleasure and satisfaction to report to you that the dentists of Arizona have oversubscribed their quota in the Fifth War Loan Drive June 19, and that returns are still coming in.

W. R. PINKERTON, *Chairman,*
Arizona Dental Society
War Bond Committee.

Dear Dr. Camalier:

UNDOUBTEDLY you will be interested to know that the Maine Dental Society's 5th War Loan quota of $70,200 was subscribed to in full this morning, June 22. We have heard from only one-fourth of the members, so we expect to double this amount before the drive closes.

With kindest personal regards and the best of luck to the Fifth War Loan Drive,

PERLEY LESSARD, *Chairman,*
Maine Dental Society.

Dear Doctor Camalier:

AM enclosing a copy of the Fifth War Bond Drive report for South Carolina. This report is considerably better than the report from the last Drive.

C. M. DOUGLAS, *President,*
S. C. State Dental Association.

SOUTH CAROLINA DENTISTS EXCEED THEIR QUOTA IN FIFTH WAR BOND DRIVE

THE American Dental Association, through communications received from the Treasury Department by C. Raymond Wells and C. Willard Camalier, was requested to participate actively in the Fifth War Bond Drive. In response to this request, the President of the American Dental Association and the chairman of the War Service Committee of the American Dental Association issued an appeal to the profession, in which they urged that all state and local societies adopt intensive programs in furtherance of the drive. The quota for South Carolina was set at $62,000, being based upon the number of dentists practicing therein. On this basis, the minimum quota from every dentist in the United States was $200 worth of bonds during the Fifth War Bond Drive. The dentists of South Carolina exceeded this quota by a good margin, buying $104,525 worth of bonds.

There are 314 white and colored dentists in South Carolina, exclusive of those serving in the armed forces. Letters were mailed to these dentists urging them to buy bonds during this drive. A self-addressed postal card was enclosed for convenience in reporting the amount of bonds purchased. Follow-up letters were later sent to those dentists who had not reported, as it was the earnest desire to hear from every dentist in South Carolina who bought bonds. It is reasonable to assume that some dentists who bought bonds neglected to report them; otherwise, the report would have been even better.

It is hoped that South Carolina's report will compare favorably with that of any state in the Union, and that the records will show that the dental profession is doing everything possible in this respect to insure victory.

FIFTH WAR BOND DRIVE REPORT

It is indeed a pleasure to report that sale of bonds to the amount of $104,525 was reported to me by the members of the dental profession of South Carolina.

Amount bought by white dentists	$ 95,300
Amount bought by colored dentists	9,225
Total	$104,525
Quota for South Carolina	$ 62,000
Amount above quota	42,525
Number of white dentists reported	164
Number of colored dentists reported	17

C. M. DOUGLAS, *President.*

COMMITTEE ON LEGISLATION

THE ADMINISTRATIVE CONTROL OF DENTAL MATTERS BY THE DENTAL CORPS OF THE NAVY

EVERY one of the forty-eight states of the Union, the District of Columbia and the Territories of the United States recognizes the dental profession as a separate and distinct entity, with its own responsibilities, problems and need for an understanding administration. To the last-named end, in civilian life, separate statutes apply to this profession, giving to civilian dentists control over dentistry. The same situation exists in all the more enlightened and progressive civilized countries of the world; but this situation does not exist in the Navy.

The persons engaged in any vocation are influenced by the things or conditions with which they habitually deal. Occupational psychology must be recognized in a realistic approach to sound administrative organization. Physicians and surgeons have their own peculiar mode of thought, unquestionably appropriate to their calling.

American dental surgery leads the world, obviously because, in this country, there was the first important instance of the dental profession being definitely established and recognized as a separate and distinct profession. The medical profession holds the view that medical doctors should not be subordinated to lay control. Medicine can best maintain its moral position before the world at large by not attempting to exercise control and domination over the well-established profession of dentistry.

The basic plan of organization of the Navy has always been that the line officer is the administrative head, symbolized and exemplified by the commanding officer of a ship. The commanding officer, in addition to line officer subordinates who are his assistants in combatant and administrative functions, has professional and technical aides and assistants in the persons of officers of the staff corps. Long established Navy custom calls for each staff officer to deal with the functions, duties and obligations of his corps, and not to interfere with or encroach upon the functions of the officers of any other staff corps.

Not many years ago, line officers of the Navy were talking of having line officers in command of naval hospitals. That could be no more obnoxious than for dental matters to be administered by *any* officers others than officers of the Dental Corps. Officers of the Dental Corps are the same kind of Americans as officers of the line and other staff corps. The objection is not merely to administration of dental matters by medical officers, but to administration of dental matters by any one outside the dental profession. The medical officers

would object to having their affairs decided by civil engineers, chaplains or supply officers. The officers of any staff corps must feelingly understand the view of dental officers about the subordination and submersion of Navy dental matters.

The officers of the Dental Corps have a simple, plain and reasonable premise:

Let the Dental Corps be accorded the same degree of autonomy by the Medical Corps as is accorded to the Medical Corps by the Line.

Through long conversations many years ago with the leading representatives of the high-minded members of the dental profession who brought about enactment of legislation establishing the Dental Corps of the Navy, I have personal knowledge that those leaders of the dental profession never for a moment expected or contemplated that Navy dental matters would be decided by Navy medical officers or administered by them. It was the idea of those altruistic men that the two professions would simply be *associated,* as is the best relationship in civilian practice, neither one dominating or directing the other's affairs. Otherwise, the words "who shall constitute the Dental Corps," in the draft of the original legislation, would not have been followed by any such reference as "and be a part of the medical department."

The Dental Corps now has a large number of mature and experienced officers. The Medical Corps should demonstrate its fair-mindedness and willingness to treat others as they themselves would be treated.

It would be appropriate for the complete administration of dental matters to be definitely assigned to officers of the Dental Corps. This has not been done and never will be done voluntarily. For that reason, legislation must be enacted to provide more efficient dental care for the personnel of the United States Navy. Active participation by all members of the dental profession will be necessary to insure the success of this highly important legislation.

STERLING V. MEAD, *Chairman,*
Committee on Legislation.

COUNCIL ON DENTAL HEALTH

SUMMARY OF REPORTS RECEIVED FROM STATE COUNCILS ON DENTAL HEALTH

KANSAS

THE Kansas State Council on Dental Health is composed of representatives of each of the district societies and the executive committees of district councils. The director of the dental division of the state board of health serves as chairman ex-officio. Councils on local, district and state levels may appoint consultants from the fields of education, health and welfare to aid in studying and formulating dental health programs and in meeting local problems. The state council on dental health sponsored and carried out the following activities during the past year:

1. High School Physical Fitness Dental Health Program. Dental forms, posters and other educational material were used in 82 per cent of the counties in the state. Articles were published in six journals of state-wide organizations. Many dental societies bought newspaper space for publicizing the program. Six copies of the films "About Faces" and "Student Flier" have been in constant use throughout the year. Many schools and the Leavenworth Induction Center reported considerable improvement in the dental conditions of high school students.

2. Social welfare programs, which are now in operation in several counties. The lack of dentists in numerous areas of the state will result in a marked curtailment of school dental programs unless some substitute activity can be inaugurated. It was suggested that public health and school nurses could be instructed in the procedure of making screening examinations of the teeth of school children and that they could stimulate teachers to greater interest in the dental conditions of pupils.

MISSOURI

The Missouri State Council on Dental Health is devoting its efforts toward the following projects: (1) High School Victory Corps Physical Fitness Dental Program; (2) health education; (3) dental industrial hygiene; (4) school health, and (5) organization of district and local councils. All of these activities are carried out through one of three committees: Civic Relations and Reference Committee, Adult and Industrial Dental Health Committee and Preschool and School Dental Health Committee. In addition to dental health programs for children and youth, considerable attention will be given to dental health activities for industrial workers. The following policies governing dental service in the dental industrial hygiene program for employes were recommended by the state council on dental health and were subsequently approved by the Missouri State Dental Association: (1) preplacement and periodic dental examinations made by qualified dentists; (2) referral of employes in need of dental service to the dentist of their choice; (3) provision of emergency dental service when and where possible; (4) dental examinations, conducted for actual and educational value and made with mouth mirrors and explorers, x-ray and other instruments required in modern practice; each examination to be complete and thorough; (5) examinations and subsequent diagnoses, when made and sub-

mitted by representatives of state and local health departments, for demonstration and educational purposes only; (6) in industrial plants having possible occupational hazards, examinations including all available measures for study of dental diseases or injuries involved in such hazards, and development of means of prevention, results of such studies to be made available through the Dental Division of the State Board of Health of Missouri; (7) limitations of the practice of dentistry within industrial plants to such procedures as are essential to diagnosis, relief of pain, elimination of infection and treatment of occupationally sustained injury and disease. The industrial dental program of the Council on Dental Health of the Missouri State Dental Association is to be approved by the district dental society before the program is recommended to industrial organizations within the district. The High School Victory Corps Physical Fitness Dental Program was carried out in seven of the eight state dental association districts. District chairmen reported good results in some of the schools of the larger communities.

MARYLAND

The State Council on Dental Health of the Maryland State Dental Association reported a total of 5,894 students examined in connection with the High School Victory Corps Physical Fitness Program in Charles, Montgomery, Allegany and Garrett counties. In the City of Baltimore, through the cooperation of the physical education department, 2,006 high school boys received dental examinations. Of this number, 54 per cent presented gross caries, gingivitis and teeth indicated for extraction. A 39 per cent incidence of oral disease was found in 401 students in three parochial high schools. In another high school, the medical staff conducted the examinations and found indications of pathologic conditions in only 8 per cent of the students. The difference between the prevalence of pathologic processes in the group examined by the medical staff and the higher prevalence of those examined by dentists may be assumed to be due to a difference in diagnostic procedures.

ALLEN O. GRUEBBEL, D.D.S.,
Executive Secretary.

COUNCIL ON DENTAL THERAPEUTICS

ULTRAVIOLET LAMPS FOR AIR DISINFECTION—NOT ACCEPTABLE FOR A.D.R

THE Council on Dental Therapeutics has authorized the publication of the following report.

DONALD A. WALLACE, *Secretary.*

THERE are several brands of lamps which have been advertised and exhibited to the dentist during the past year with claims for usefulness in disinfecting the air of the dental office and operating room. Since all these lamps, and the claims made for them, are essentially similar, they will be discussed in this report without reference to trade names.

The lamps consist of a straight transparent tubular bulb, backed by a reflector. The bulb emits visible light and also ultraviolet (invisible) radiation that includes a range of wave lengths which are lethal to a variety of organisms, among them certain bacteria. The radiation from the lamp is highly irritating to human skin and eyes and the lamps are therefore equipped with a shield.

The lamp is usually installed well above ordinary eye level on the wall of the room and is directed in such a manner that the rays pass only across the upper part of the room. Evidence indicates that a portion of the bacteria which come into the lethal range of the radiation will be killed. Conversely, the radiation will have no effect on the bacteria which it does not strike. Convection currents are relied upon to float the bacteria upward and into the path of the beam.

Lamps similar to those advertised to the dental profession have been found to be useful in the prevention of cross-infection in hospital operating rooms, wards and nurseries[1, 2] where they can be operated under close supervision with their limitations known to the hospital personnel, and where conditions are such as to favor their effectiveness in killing pathogenic micro-organisms.

However, there is no acceptable evidence that they are useful in the dental office or waiting room. In the dental office, the dentist, assistant and patient are in close proximity to one another and the work is done in the oral cavity, which, with the nasal passages, is the source of most pathogenic air-borne organisms. Thus, the relative likelihood of direct person-to-person infection is much greater than in the hospital environments in which the lamps are considered to be effective. Patients who visit the dentist usually stay for only a short time, and it is questionable whether the maintenance of even a sterile atmosphere in the dental office or waiting room would benefit the patient to a practical degree. The protection which the lamp would afford the dentist and his assistants is minimized by the greater possibility of direct infection, as mentioned above.

In the opinion of the Council, a better means of protecting the patient and dental office personnel against cross-infection is a gauze face-mask.

In view of the foregoing, ultraviolet lamps intended for the disinfection of air are unacceptable for A.D.R. The Council will continue to evaluate evidence relative to ultraviolet disinfecting lamps as it appears.

BIBLIOGRAPHY

1. Report of Council on Physical Therapy, *J.A.M.A.*, 123:92, September 11, 1943.

2. WELLS, W. F.; WELLS, M. W., and WILDER, T. S.: *Am. J. Hygiene*, 35:97, January 1942.

ACCEPTED DENTAL REMEDIES

The Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following articles in the list of Accepted Dental Remedies:

ANESTHETICS—LOCAL*

Procaine HCl 2%, Epinephrine 1:25,000: Each cubic centimeter is stated to contain procaine hydrochloride, 0.02 Gm.; epinephrine, 0.00004 Gm.; sodium chloride, 0.005 Gm.; sodium bisulfite, 0.0019 Gm., and distilled water. Marketed in cartridges, approximately 2.5 cc.

Procaine HCl 2%, Epinephrine 1:50,000: Each cubic centimeter is stated to contain procaine hydrochloride, 0.02 Gm.; epinephrine, 0.00002 Gm.; sodium chloride, 0.005 Gm.; sodium bisulfite, 0.0019 Gm., and distilled water. Marketed in cartridges, approximately 2.5 cc.

Procaine HCl 2%, Neo-Synephrine HCl 1:2,500: Each cubic centimeter is stated to contain procaine hydrochloride, 0.02 Gm.; neo-synephrine hydrochloride, 0.0004 Gm.; sodium chloride, 0.005 Gm.; sodium bisulfite, 0.0019 Gm., and distilled water. Marketed in cartridges, approximately 2.5 cc.

Manufactured by S. F. Durst & Co., Philadelphia, Pa.

ZINC OXIDE-EUGENOL CEMENTS†

Thymol Zinc Oxide Cement with Oil of Cloves and Chlorobutanol (Buffalo Dental Manufacturing Co.): Powder: Each hundred grams is stated to contain zinc oxide, 91.66 Gm.; barium sulfate, 4.17 Gm.; asbestos, 4.17 Gm. Liquid: Each hundred grams is stated to contain thymol 28.57 Gm.; chlorobutanol, 14.29 Gm.; oil of cloves, 57.14 Gm.

Manufactured by the Buffalo Dental Manufacturing Company, Buffalo, N. Y.

PHENOLIC COMPOUNDS‡

Thymol-Alcohol Mixture (Buffalo Dental Manufacturing Co.): Each hundred grams is stated to contain thymol, 50 Gm; ethyl alcohol, 50 Gm.

ACTIONS AND USES: For cavity disinfection.

Manufactured by the Buffalo Dental Manufacturing Company, Buffalo, N. Y.

Admission of a product to the list of Accepted Dental Remedies does not imply a recommendation. It means that the product and the methods by which it was marketed at the time of consideration were not found to be in violation of the Council's published rules. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics. All information is available, upon request, and inquiries are welcomed. A postal card will bring a prompt reply.

DONALD A. WALLACE, *Secretary.*

*A.D.R. Ed. 10, p. 39.
†A.D.R. Ed. 10, p. 216.
‡A.D.R. Ed. 10, p. 174.

BUREAU OF PUBLIC RELATIONS

YOUR NEW TEETH

THE success of artificial dentures depends largely on the use and care given them. The following suggestions are presented with the idea of giving advice which will aid in obtaining maximum comfort and the best service possible.

DETERIORATION OF NATURAL TEETH

Nature provides each individual with many important organs, each of a specific purpose, the eyes to see, the ears to hear, the heart for circulation, the stomach for its part in the process of digestion. Among the important organs of the body are the teeth, which prepare food for digestion and assimilation, aid in speech and help build facial expression and personality.

As the years go by, the various organs of the body, through use, disease, neglect and abuse, become impaired, and, in some instances, are totally lost. The eyes are dimmed, the hearing becomes indistinct, the fingers lose their deftness; and so, in the various parts of the body, we deteriorate.

The teeth are particularly susceptible to destruction, through wear, disease, abuse and neglect; and the result is that these important organs of expression, mastication and speech are often lost early in life.

MODERN DENTISTRY

Fortunately, the art and science of dentistry has provided means by which the lost natural teeth can be replaced with substitutes which simulate quite accurately the natural teeth in their various functions. These substitutes are properly called "artificial dentures."

NATURAL DENTURES

Nature provides two natural sets of teeth or dentures. The first set consists of twenty "baby," or deciduous, teeth. The second set consists of thirty-two so-called permanent teeth.

It is Nature's plan that the deciduous teeth shall be lost and be replaced by the larger and stronger permanent teeth.

Nature intended that the second or permanent teeth should last throughout life; but owing to some of the conditions before mentioned, these valuable organs may be lost; and dentistry is called on to substitute a third set, the artificial denture.

DISCOMFORT

It is singular that the advent of the baby teeth may cause fretfulness and discomfort. Discomfort and pain may also accompany the eruption of the second, or so-called permanent, teeth.

In natural sequence, then, a period of discomfort may attend the initiation of the third set, or artificial teeth.

ENUNCIATION

A little difficulty in enunciation may be experienced, owing to the presence of foreign material in the mouth. A few hours' practice will acquaint one suf-

*The growth of public interest in dental health has resulted in a marked increase in requests for information on different phases of the subject. To meet this demand, the Public Health and Education Committee, now a subcommittee of the Council on Dental Health, has authorized the preparation of a series of twelve articles in pamphlet form each article to deal with one of the dental questions most frequently asked by the public.

This revised copy of "Your New Teeth" by B. L. Hooper will become one of this series. Reprints at nominal cost can be obtained by addressing the Bureau of Public Relations, American Dental Association, 222 E. Superior St., Chicago 11, Ill.

ficiently with the denture that little trouble will be had in this respect.

If the artificial teeth click together in talking, the wearer should speak more slowly, trying to avoid movements that raise or move the lower denture.

The stability of the lower denture depends largely on the ability of the wearer to hold it in place with the muscles of the lips, cheeks and tongue. These muscles may tend to dislodge the dentures when they are first worn, but properly trained muscles become important factors in retention and stability.

Reading audibly, with attention centered on pronunciation rather than on the subject material, is good practice to overcome any interference encountered in speaking.

FACIAL EXPRESSION

Facial expression may seem slightly altered at first; but, as the dentures are worn, and the muscles of expression in the cheeks and lips become adjusted so that they function normally, natural facial expression will be resumed.

As often as one sees his face in the mirror, and as fastidious as most persons are about facial appearance, it is surprising how many details concerning facial dimension and contour are completely overlooked during the greater part of life.

Few people realize how unsymmetrical the face is, how much the right side may differ from the left, until they have artificial dentures. They then become critical of facial appearance, perhaps noticing that the mouth turns up more on one side than the other, the depression at the side of the nose is deeper on one side than the other, or in smiling more of the teeth show in some areas than in others. They realize that the nose is not in the exact middle of the face or that it is set slightly askew in relation to eyes, mouth and ears, and that the mouth may not be in the middle of the facial features.

Numerous details might be mentioned. However, the important thing is that many of these details are not observed by the individual until AFTER he starts to wear artificial dentures. The conditions probably existed while the natural teeth were in the mouth, but the face did not receive the careful and critical scrutiny then that it is given after artificial dentures are inserted. It is natural then for the patient to become unhappy, and often he may feel that the dentist failed to restore the natural facial features.

Denture patients should not expect the dentist to remove, alter or correct certain features with which Nature endowed them, features that have been carried all through life, features that could not be affected by the wearing of artificial dentures.

In some instances, it is possible for the dentist to improve certain facial lines. Marked abnormality of tooth conditions or alinement may be modified; the facial contour may be made more symmetrical, depressions may be eliminated or other undesirable features may be minimized. However, it should be borne in mind that these are individual distinguishing features. Friends and relatives of the patient have learned to know and recognize him by them, and great care should be exercised and thought given to the amount of modification, alteration or improvement that is to be attained by means of artificial dentures.

MASTICATION

The most trying experience in the wearing of new dentures is eating. It is difficult to manipulate both teeth and food in the effort to chew. One must be patient and persistent. Foods which require very little chewing should be selected. Foods which require considerable pressure for mastication should be avoided entirely for several days; and even after one becomes accustomed to

the use of the teeth, care should be taken not to use the dentures too vigorously, to avoid tissue destruction under the dentures.

Slow mastication of small bites will facilitate the use of artificial teeth. Food may pass under the dentures with resultant discomfort; but as the dentures are worn, they become seated more securely, and this disagreeable feature will be less noticeable.

In biting off a morsel of food, it is much better to press the food back against the teeth and, at the same time, break the food off with a twisting motion of the hand. This method will help hold the dentures in place and also make the process of biting off food easier.

One of the ambitions of the average denture wearer is to eat corn on the cob. This may be done provided the ridges of the mouth can support the pressure, and the denture patient learns the trick of pressing the corn back against the teeth while biting. Persons who have excellent ridges and mouth tissues that will tolerate heavy pressure can eat apples quite easily if the apple is pressed firmly against the teeth while biting. However, as few patients are able to master this difficult feat, one should not be discouraged if he cannot bite a piece out of an apple. These more difficult feats of mastication should not be attempted too often: the mouth tissues should not be overtaxed.

Infinite patience is required in learning to eat; and until one learns to manipulate the new teeth, and the gums and ridges have become toughened to pressure, one should not expect to eat anything and everything.

It takes several weeks for the gums and ridges to become hardened and toughened to their new task. If sore areas develop, an appointment should be arranged, when the dentist will adjust the dentures and give relief in these areas.

WEARING DENTURES DAY AND NIGHT

Unless the patient is otherwise directed, dentures may be worn at night. They must be carefully cleaned before retiring. If dentures are worn constantly, the face will hold its normal shape, and the dentures can be worn more comfortably.

If it seems necessary to remove the teeth to rest the mouth, the patient should rinse them in cold water, rinse the mouth in cold water and replace the dentures. If they are left out of the mouth, any irritated places on the ridges or tissues may swell, making it difficult or impossible to place the teeth back in the mouth.

Dentures should be kept moist; and in case it becomes necessary to leave them out of the mouth for some time, they should be placed in water or a boric acid solution.

CARE OF DENTURES

Artificial dentures, like natural teeth, must be kept clean and free from deposits in order to preserve the health of the mouth. A brush made especially for artificial dentures can be procured at any drug store. The bristles of these brushes are stiffer than those in the ordinary toothbrush.

Artificial dentures should be brushed with a cleansing agent, and rinsed in running water, and the mouth should be rinsed thoroughly on arising in the morning, after each meal and before retiring. Ordinary baking soda, a fine cleansing powder or a paste prepared especially for dentures may be used for the cleansing agent. The denture should be thoroughly scrubbed and rinsed well before it is replaced in the mouth.

To avoid breaking the teeth by dropping them in the washbowl, it is a good plan to fill the bowl from one-third to one-half full of water, then brush the teeth near the surface of the water. Should the denture slip from the hand,

the water will act as a cushion, and prevent damage.

Recently developed denture base materials, in which the teeth are set, are an improvement over materials previously used. These materials need no special care, other than scrupulous cleanliness to keep them free from tartar and other deposits.

Tartar will gather on artificial teeth as on natural teeth. Periodic visits to the dentist for cleaning and polishing the dentures are as important as such care of natural teeth.

STERILIZING DENTURES

Dentures should never be placed in hot water or have hot water poured over them to sterilize them. After a thorough cleaning with a stiff bristled-brush as before directed, dentures may be immersed in boracic acid solution or an antiseptic wash, where they should be allowed to remain several minutes.

BREAKAGE AND REPAIR

Dentures should be handled carefully when out of the mouth. To drop them but a few inches into the wash bowl may mean the breaking of a porcelain tooth. Other accidents may mean greater damage. After any accident to the denture, it should not be worn, as wearing makes the repair more difficult and more costly.

A denture wearer may be saved much discomfort and embarrassment during the time that his denture is being repaired if he is prepared for such emergency by having an extra or "spare" denture. One whose occupation takes him away from home and his dentist, or who must meet the public constantly, can ill afford to be without duplicate dentures. Especially when planning a trip abroad should this be taken care of in order that traveling and visiting time may not be taken up with dental repairs.

LOOSENESS AND FACIAL WRINKLES

The ridges on which the dentures are supported are quite transitory. The shrinking away of this tissue has two undesirable results. In a large percentage of cases, the ridges recede or shrink away, which causes the dentures to become loose and permits a change in the facial expression.

Sometimes, the shrinkage or recession is such that the dentures do not loosen, but the facial expression is altered, because, as the shrinkage progresses, the jaws come closer together. This closing together of the jaws gives the denture wearer deep lines and wrinkles about the lower part of the face, which gives an aged appearance, and also impairs the function of mastication.

The accompanying illustrations show the changes that take place in the face as the ridges on which artificial dentures rest in the mouth shrink or resorb.

Figure 1 shows the natural and normal expression with natural teeth, or with

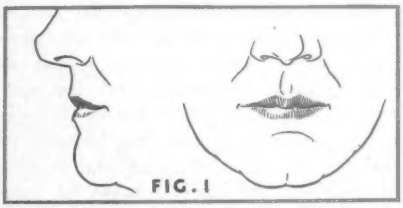

Fig. 1.—Natural, normal expression with natural teeth or with artificial dentures when first inserted in mouth.

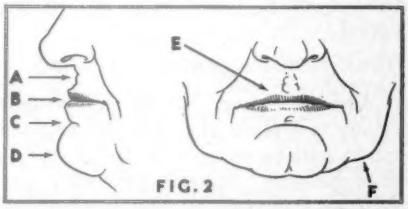

Fig. 2.—Effect of wearing same artificial dentures for too long a period.

artificial dentures when first inserted in a mouth.

Figure 2 shows the effect of wearing the same artificial dentures for too long a period. Resorption of the ridges underneath the dentures has allowed these changes to develop:

Wrinkles or depressions form in the upper and the lower lips (A and C).

The lips become compressed and protrude (B).

The chin moves forward and upward and becomes pointed (D).

The cupid's bow loses its shape and the lipline straightens (E).

Pouches become pronounced on each side of the lower jaw (F).

To avoid these old-age expressions, dentures should be rebuilt or new ones constructed periodically, every two or three years being an average period.

NEW BASES

When shrinkage of the ridges progresses to a place where the dentures are too loose to be worn or the facial appearance becomes changed noticeably, the dentures should be rebased or rebuilt, or a new set may be necessary.

The rebuilding or rebasing process is not considered a part of the original construction of the dentures owing to the fact that shrinkage is such a variable factor. Dentures may require rebuilding in but a few months, or they may give satisfactory service for a year or more with additional care. When the dentures are rebuilt or new ones made, the original facial expression and the retention of the dentures are restored.

It is impossible to determine how soon rebuilding will be necessary after the dentures are made, or how often it may be necessary thereafter in order to retain the normal facial expression.

There are many conditions which influence the rapidity of the shrinkage, such as the general health of the individual, the amount, extent and virulence of the disease which existed about the natural teeth and the condition of the ridges after the natural teeth are removed. As time goes on, the ridges shrink less and less, so that the need for periodic rebuilding become less frequent.

DEPENDING ON DENTIST, NOT ON HEARSAY

The following conditions may be experienced in learning to wear new dentures, all of which will disappear as one becomes accustomed to the new teeth: a feeling of looseness, tipping of the dentures in chewing, increase in flow of the saliva, clinging and sticking of food to dentures, passage of food under the dentures, slight crowding of the tongue or a feeling of bulk and a slight gagging sensation.

As no two persons encounter the same difficulties or experience the same satisfaction with dentures, advice from friends or relatives should not be regarded seriously. Your case is individual and may be entirely different. Your dentist is in a position to advise you and his instructions should be followed.

NEW DENTAL EDUCATIONAL PAMPHLETS

THE National Dental Hygiene Association, of Washington, D.C., recently issued two excellent pieces of dental educational material for lay consumption. The first and more pretentious is a second edition of "Facts About Teeth and Their Care." Few changes have been made in the original text, but the format of the second edition is entirely new and a number of interesting and informative illustrations have been added.

"Facts About Teeth and Their Care" was prepared by a committee of the American Association of Public Health Dentists. Educators, as well as dentists, will find it exceedingly helpful.

The second article is a small folder entitled "How To Save Teeth and Money." This inexpensive leaflet for parents contains basic information on the care of children's teeth. Both it and "Facts About Teeth and Their Care" can be obtained at small cost from the National Dental Hygiene Association, 934 Shoreham Bldg., Washington 5, D.C.

DR. GLENN E. CARTWRIGHT ELECTED PRESIDENT OF DENTAL HYGIENE INSTITUTE

GLENN E. CARTWRIGHT, past president of the Chicago Dental Society, was elected president of the Dental Hygiene Institute of Chicago at its annual meeting June 13. The institute is an autonomous civic organization, carrying on a program of dental health education for the lay public in Cook, Lake and DuPage counties, Illinois.

Other officers elected to serve with Dr. Cartwright are J. Walker Black, first vice-president; Mrs. Leonard H. Graf, Summer Round-Up Chairman of the Illinois Congress of Parents and Teachers, second vice-president; L. Russell Hegland, executive secretary of the Chicago Dental Society, secretary, and Felix S. Tittle, chairman, Chicago Dental Society's Public Relations Committee, treasurer.

Directors elected this year are A. H. Pritzlaff, director of physical education, Chicago Board of Education; Msgr. D. F. Cunningham, superintendent, Catholic School Board; Leo W. Kremer, D.D.S., past president, Chicago Dental Society; Lon W. Morrey, D.D.S., Director of the Bureau of Public Relations, American Dental Association; Thomas E. Fleming, D.D.S., and Robert I. Humphrey, D.D.S., vice-president, Chicago Dental Society.

Directors who continue in office are: Earl K. Spangler, Chicago manager, L. D. Caulk Company, Jules M. Ehrhardt, president, Ehrhardt & Company; Harry B. Price, president, Price Dental Depot; Mrs. Sidney Levy; Mrs. Theodore B. Sachs, executive secretary, Tuberculosis Institute of Chicago and Cook County; Thomas G. McMahon, secretary-treasurer, Thomas J. Dee Company; H. R. H. Brevig, D.D.S., and John J. Hollister, Business Manager of the American Dental Association.

OBITUARIES

C. VICTOR VIGNES, A.M., D.D.S., D.Sc., F.A.C.D.

(1867-1944)

A LIFETIME of 76 years, thirty of them spent in the service of Loyola University, was ended April 1, 1944, when C. Victor Vignes, dean emeritus of the Loyola University School of Dentistry, died suddenly at his home in New Orleans.

Funeral services were conducted Sunday, April 2. Religious rites at the Holy Name of Jesus Church were conducted by the Rev. J. B. Bassich, S.J., regent of the Loyola University School of Dentistry. Pallbearers were members of the student body, in accordance with a request made by Dr. Vignes shortly before his death.

Born in Pointe Coupee Parish, Louisiana in 1867, and a graduate of the Louisville College of Dentistry in 1892, Dr. Vignes came to New Orleans in 1897. He organized the Loyola University School of Dentistry in 1914, and served as dean and professor of clinical dentistry for twenty-three years. At the time of his death, he was dean emeritus of the school, an honor conferred on him in 1937.

Shortly after coming to New Orleans, Dr. Vignes helped to organize the New Orleans College of Dentistry, which afterwards became the Dental School of Tulane University. He served as a visiting dental surgeon at Charity Hospital from 1897 until 1919. During four years, from 1900 to 1904, he served in the state senate and was instrumental in the passage of state laws governing the practice of dentistry in the state.

In addition to the D.D.S. degree, Dr. Vignes held the degrees of A.M., F.A.C.D., and D.Sc. In 1939, an honorary undergraduate organization at Loyola was named the C. Victor Vignes Odontological Society, in recognition of his outstanding attainments. The honorary degree of doctor of sciences was conferred upon him by Loyola University in 1942.

A first lieutenant in the Dental Corps,

C. VICTOR VIGNES
(1867-1944)

United States Army, during the first World War, Dr. Vignes was promoted to major in 1918. The following year he was advanced to lieutenant colonel, Dental Reserve Corps.

An active member of his profession for more than fifty years, Dr. Vignes achieved many city, state and national honors. At one time or another, he

served in every office of the city and state dental societies. In 1918, he was elected President of the National Dental Association, now the American Dental Association. Dr. Vignes was very active in the affairs of the Association of Dental Faculties, now in the American Association of Dental Schools, and served for many years on the Dental Educational Council of America. He was a member of the Delta Sigma Delta fraternity, international dental fraternity, and Omicron Kappa Upsilon, national honorary dental fraternity. He was also active in the Knights of Columbus.

CLARENCE V. WATTS, D.D.S., F.A.C.D.

(1867-1944)

THERE was a noticeable aura of gloom over the Iowa State Dental Society meeting in Des Moines the first of May. The usual cordial meeting of fellow with fellow, while there as usual, was more restrained, for the light of the meeting was wanting. About the first man that we usually met was Clarence Watts, with his bright smile and his cheery greeting, coupled with a handshake that demonstrated his whole-hearted interest in our welfare. The note of sadness that went with the word "Clarence is dead" was universal, for there was no man in the state who commanded more love and admiration than did Clarence V. Watts. I would fain write at length about him, but his reticence in regard to his life and attainments makes that impossible. When writing the biographies of the leading men of the state, I wanted to write that of Clarence, as well as of his father, but he declined to give me any data concerning either of them. Thus, at this time, I am able to write only what I personally know of him. But that would fill many pages, for my companionship with him had been long and close.

Clarence V. Watts was born in Des Moines, Iowa, February 10, 1867. His father, Jackson Watts, was a practicing dentist of that state, and a man of prominence in the profession which he graced for many years. His mother was a beautiful woman and of great charm, and from her Clarence inherited much of his charm of personality and grace of person. Dr. Watts was devoted to his mother and paid her the greatest homage on all occasions. I remember that we went to see her at one time when she was in the hospital and her room re-

CLARENCE V. WATTS
(1867-1944)

sembled a conservatory, for it was filled to the ceiling with flowers, the gift of her devoted son.

Clarence practiced with his father from the time of his graduation from the University of Pennsylvania in the class of 1891, and, after his father's death, continued in practice until his death. He joined the Iowa State Dental Society im-

mediately after his graduation and became a life member. He was offered all of the honors of the profession of his state. He was president of the society at one time and filled many other positions of the organization. He was always in attendance and was really the host of the convention whenever it met in Des Moines, which was frequently. His gracious presence was always in evidence and his cheery smile and words were always the bright spot of the convention. Wherever we went, in the lobby of the hotel, in the committee rooms, at the clinics, the lectures or any other place in the convention, Clarence was there, and we all knew that, he being there, all was well.

Dr. Watts was devoted to his profession and I doubt whether there is any man in the profession who was better known all over the United States, yes, and in Europe and Mexico as well, for he attended most of the conventions in this country and in Europe and Mexico also. That he was a great dentist is known to all men, but great as that tribute is, it is not the best thing that we can say of him, for he was not only great in his profession, but towering over his professional attainments he was, we can truthfully say, a man. A dentist, yes; a man devoted to the civic interests of his city, yes; a man of culture and refinement and a lover of art and all of the finer virtues, yes; but above and beyond all of these virtues, he attained the plaudit "Well done, good and faithful servant," for, as was said of Abou Ben Adam, "his name led all of the rest," for he loved his fellow men.

Although Dr. Watts never married, his great affection for children was demonstrated when in his will it was discovered that he had left a large part of his not inconsiderable estate to an orphan asylum of his native city.

Clarence Watts made a place for himself in the hearts of his fellow practitioners, and he will need no towering marble shaft in some beautiful cemetery, nor a granite mausoleum to mark his resting place. His monument is in the hearts of those that knew and loved him, for as love begets love, he has inherited that which he so freely gave during his life.

JOHN V. CONZETT.

DEATHS

ALLAIRE, ALBERT J., Brockton, Mass.; University of Maryland, School of Dentistry and the Baltimore College of Dental Surgery, 1910; died May 17.

BEDDOW, EMMA MATILDA, Seattle, Wash.; died May 10; aged 75.

BENDER, T. C., Lodi, Calif.; University of California, San Francisco, 1892; died May 24.

BOCK, A. J., Macksville, Kan.; Western Dental College, Kansas City, 1917; died May 17.

BRITT, L. L., Orlando, Fla.; Southern Dental College, 1915; died June 4; aged 51.

BROWN, EGBERT W., Greenburgh, N. Y.; New York College of Dentistry, 1898; died June 4; aged 71.

BUCK, CHARLES L., South Paris, Maine; died May 22; aged 76.

BUSWELL, WALLACE G., Bangor, Maine; died June 1; aged 87.

BUTCHER, JOHN WEST, Washington, D. C.; died in England, February 4, 1944, in service as captain in the U. S. Army Dental Corps; aged 28.

CEPHAS, ALBERT, Baltimore, Md.; died in Texas in December 1943, in service as second lieutenant in the U. S. Army Dental Corps.

COBBS, R. H., Columbus, Ga.; Meharry Dental College, Dental Department of Meharry Medical College, 1898; died in January.

CONNER, ROBERT, Des Moines, Iowa; died May 23; aged 71.

COSTELLO, WILLIAM EDWARD, Piqua, Ohio; died June 11; aged 65.

DAVIS, GUILFORD B., Chicago, Ill.; Northwestern University Dental School, 1904; died June 6; aged 64.

ERICSSON, HARRY G., Norristown, Pa.; died June 19; aged 45.

FARRAR, FIELD, Fort Worth, Texas; Northwestern University School of Dentistry, 1913; died May 11.

FAULKNER, C. E., Worcester, Mass.; Tufts College Dental School, 1922; died June 12; aged 43.

GILBERT, W. H., Austin, Texas; died May 30.

GOLDBERG, HARRY H., Buffalo, N. Y.; University of Buffalo, School of Dentistry, 1916; died May 12; aged 51.

GRESHAM, CLYDE MORTIMER, Seattle, Wash.; Temple University School of Dentistry, 1908; died May 19; aged 64.

HISCOX, VERNON, Norwich, Conn.; University of Maryland, School of Dentistry and the Baltimore College of Dental Surgery, 1896; died May 30.

HITE, HESKETT, Washington, D. C., Georgetown University, College of Dentistry, 1919; died May 19; aged 52.

KEELEY, J. FRED, Fall River, Mass.; Baltimore College of Dental Surgery, 1917; died May 22; aged 53.

KERLEY, WILLIAM A., Los Angeles, Calif.; University of Louisville, School of Dentistry 1902; died in May; aged 74.

KOTTS, FRED A., Toledo, Ohio; University of Michigan, College of Dental Surgery, 1887; died May 18; aged 82.

LIND, ADAM, Kankakee, Ill.; Northwestern University Dental School, 1903; died June 14; aged 71.

MATTHIASSON, M. J., Randolph, Wis.; Marquette University, School of Dentistry; died May 9; aged 43.

MERRILL, STEPHEN D., York, Maine; died May 28; aged 81.

MITCHELL, THORNTON C., Philadelphia, Pa.; Meharry Dental College, Dental Department of Meharry Medical College, 1920; died February 15.

MOORMAN, RUSSEL F., Winchester, Ind.; Indiana University School of Dentistry, 1926; died May 30; aged 40.

MORRICAL, ISAAC C., Farmer City, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1907; died March 14; aged 69.

NAGLE, HILTON A., San Francisco, Calif.; College of Dentistry, University of California, 1923; died May 30; aged 46.

PERKINS, JESSE B., Stanford, Ky.; University of Louisville, School of Dentistry, 1912; died June 8; aged 58.

PFEIFFER, GILBERT ALWIN, Oshkosh, Wis.; Marquette University, School of Dentistry, 1924; died May 7; aged 43.

READ, H. R., Heber, Utah; Chicago College of Dental Surgery, Dental Department of Loyola University, 1901; died May 16; aged 64.

REDMOND, HENRY H., Denver, Colo.; University of Pittsburgh, School of Dentistry, 1897; died March 16; aged 80.

RITCHIE, WALTER, Bloomington, Ill.; University of Pittsburgh, School of Dentistry; died June 11; aged 65.

ROES, FRANK J., Linden, N. J.; Temple University School of Dentistry; died June 17; aged 36.

SCHNIEDWIND, ERNEST A., Chicago, Ill.; Northwestern University School of Dentistry; died June 6; aged 58.

SHANNON, EDMUND H., Cleveland, Ohio; University of Michigan, College of Dental Surgery, 1899; died June 5; aged 65.

SMITH, OWEN PETER, Peoria, Ill.; State University of Iowa, College of Dentistry, 1923; died May 16, aged 43.

TIBBETS, CHARLES J., Chicago, Ill.; died May 23; aged 87.

TRAVER, FRANK A., Milwaukee, Wis.; died May 18; aged 85.

VANDERLIP, GEORGE G., San Rafael, Calif.; died May 29; aged 75.

WASHBURN, JOHN G., Alhambra, Calif.; University of Southern California, College of Dentistry, 1914; died May 24; aged 53.

WATSON, R. E., Petersburg, Mich.; died May 26; aged 71.

WENDT, OTTO H., Kenwood, Md.; Georgetown University, School of Dentistry, 1916; died June 2; aged 54.

WILLIAMS, WILLIAM M., Cincinnati, Ohio; Cincinnati College of Dental Surgery; died May 16.

WOLKIN, GEORGE, Brooklyn, N. Y.; Pennsylvania College of Dental Surgery, 1905; died May 22; aged 65.

CURRENT LITERATURE

Journal of Dental Research

April 1944

Titles marked with an asterisk are reviewed below.

*The Effect of Proteolytic Enzymes on Acid Formation in the Mouth. L. S. Fosdick and G. W. Rapp, Northwestern University—81.

*The Effect of Amylolytic Enzymes on Acid Production in Saliva. L. S. Fosdick and G. W. Rapp, Northwestern University—85.

*Studies on the Incidence and Cause of Dental Defects in Children. VI. Pits and Fissures. Marcu Brucker, Board of Education, Newark, N. J.

*Studies on the Incidence and Cause of Dental Defects in Children. VII. Fissures and Caries. Marcu Brucker, Board of Education, Newark, N. J.—101.

*A Study of the Bilateral Incidence of Carious Lesions. David B. Scott, University of Rochester and University of Maryland—105.

A Critical Microscopic Technic Applied to Study of Human Dentin. Wardlaw M. Hammond, Lester W. Burkett, and Seymour J. Kreshover, University of Pennsylvania and Yale University—111.

*A Study of the Pattern and Combinations of Congenitally Missing Teeth in Man. Peter J. Brekhus, Clarence P. Oliver and George Montelius, University of Minnesota—117.

Congenital Partial Hemihypertrophy Involving Marked Malocclusion. Charles E. Rudolph, and Rudolph W. Norvold, University of Minnesota—133.

Dental Caries. Bernhard Gottlieb, Baylor University—141.

International Association for Dental Research, Proceedings of New York Section, January 27, 1944, compiled by Frances Krasnow—151.

The Effect of Proteolytic Enzymes on Acid Formation in the Mouth

By L. S. Fosdick and G. W. Rapp

Saliva was gathered from caries-active mouths. Glucose was added to a concentration of 10 per cent and the mixture was allowed to ferment. The rate of acid formation in this mixture was then determined. The effect of varying concentrations of papain, trypsin and pancreatin on the rate of acid formation was then investigated and it was found that the addition of trypsin and papain increased acid formation, whereas the addition of pancreatin showed no appreciable effect. No explanation as to the cause of the increase was offered.

The Effect of Amylolytic Enzymes on Acid Production in Saliva

By L. S. Fosdick and G. W. Rapp

Saliva was gathered from caries-active mouths. Glucose was added to a concentration of 10 per cent and the mixture was allowed to ferment and the rate of acid formation in this mixture was determined. The addition of pancreatic and salivary amylase was found to increase the rate of acid formation under these conditions.

Studies on the Incidence and Cause of Dental Defects in Children. Pits and Fissures

By Marcu Brucker

In this study, the caries incidence in the first permanent molars was determined for a group of 5,246 cildren, ranging from 5 to 15 years. The findings accumulated do not confirm the contention that "98 per cent of these teeth do become carious," that ninety-nine out of every 100 fissures will eventually become carious and that 95 per cent of these teeth are defective on eruption. The evidence in favor of opening all fissures, whether carious or not, is only circumstantial and the wisdom of cutting out perfectly formed enamel in teeth which are not, but possibly may become, carious does not appear justified.

Of the total number of molars studied in the white children, 35 per cent were carious. The negro boys and girls showed a lower percentage, a fraction over 26 per cent of the first permanent molars. Of the 4,536 white children studied, 1,106 showed four first permanent molars each free from caries. Of the total of 710 negro children investigated, 309 showed four first permanent

molars each free from caries. The extent of immunity to caries of these teeth in many persons is significant.

Studies on the Incidence and Cause of Dental Defects in Children. Fissures and Caries

By MARCU BRUCKER

THIS study of 5,001 children with a total of 11,410 non-carious first permanent molars demonstrated that caries of these teeth cannot be directly related to the presence of defective fissures. The claim made by advocates of prophylactic odontotomy that 98 per cent of the occlusal surfaces of the first permanent molars became carious and that the factor most responsible for this condition is the presence of defective fissures on these aspects of so many of these teeth was not substantiated. The investigation revealed a total of 1,296 imperfect fissures in the 9,463 first permanent studied in the white children and a total of 147 defective fissures in the 1,947 permanent molars considered in the colored children.

A Study of the Bilateral Incidence of Carious Lesions

By DAVID B. SCOTT

THE term "bilateral caries" is used to describe lesions in identical surfaces of corresponding teeth on opposite sides of the mouth. "Unilateral caries" refers to a pair of similar surfaces, one of which is caries free. Combination of these two conditions is called mixed caries. Three hundred individual pairs of left and right posterior bitewing roentgenograms, showing two premolars and first and second molars were examined. Of the decayed, missing, or filled teeth, 73.1 per cent were involved bilaterally. Of these, 15 per cent were also unilaterally carious on other paired surfaces (mixed caries). The remaining 26.9 per cent of the teeth were affected unilaterally only. Bilateral caries were found in 95.3 per cent of the persons represented; 2 per cent showed unilateral lesions only, and 3 per cent appeared roentgenographically free from caries. The order of incidence of bilateral caries according to teeth is similar to that reported in undifferentiated caries studies. Unilateral lesions tend to occur in reverse order. The data indicate a marked tendency toward bilateral symmetry in carious lesions of posterior teeth. Findings are supported by etiologic and predisposing conditions generally conceded to be active in caries production. Knowledge of the tendency is important for diagnosis and prognosis of dental caries.

A Study of the Pattern and Combinations of Congenitally Missing Teeth in Man

By PETER J. BREKHUS, CLARENCE P. OLIVER and G. MONTELIUS

AMONG 11,487 dental patients, 195 congenital dental anomalies were found. Examinations included intra-oral roentgenograms, mouth impressions and personal histories. The average age of 184 persons with congenitally missing teeth was 22.9 years. From fourteen to nineteen teeth were missing in seven persons, including a mother and daughter lacking, respectively, fourteen and sixteen posterior teeth although their arches were normal in size. Of 644 missing teeth in 184 persons, the most frequently missing were the upper second incisors, the next the third molars, second premolars and lower first incisors; the others being absent to a lesser degree. The main difference among the four quadrants was found in the upper and lower incisors. The observed pattern indicates that the reduction in the dental arch follows a definite formula.

If the 168 non-related persons of the 184, with one exception, were employed as a measure, in 1.5 per cent of the patients, there were congenitally missing teeth. Upper second incisors, third molars, second premolars and other teeth were missing, respectively, in 1, 0.6, 0.6 and 0.3 per cent of the patients. Combinations involving more than one kind of teeth were found in one-half of the cases. Observed combinations occurred more often than was expected on mere chance, and the number of families (four pedigrees given) in which several members of a family have different kinds of teeth missing suggests that the inherent defect may have a variable expression in different members of a family.

INCIDENTS OF PRACTICE

Delayed Neuralgic Symptoms

EDMUND P. ROBERTS, D.D.S., Newark, N. J.

History.—A woman, married, aged 70, gave a history of severe intermittent neuralgic discomfort for the duration of one month, accompanied by occasional swelling and soreness of the lower jaw. All the teeth had been extracted thirty-two years earlier and, since that time, the patient had worn full upper and lower dentures without any discomfort.

Examination.—Clinical examination disclosed edentulous maxillary and mandibular arches both of which were fitted with suitable full dentures. There was a slight sub-

maxillary glandular enlargement on the left side.

Roentgenographic examinations (occlusal and lateral views) were negative for salivary calculus. Intra-oral examination revealed all edentulous areas negative with the exception of the mandibular left second bicuspid area, which presented a retained root together with an area of bone disease. The retained root was in the area of the mental foramen and appeared to be resting on top of the mandibular canal. There was also some evidence of depression of the mandibular canal.

Operation.—The retained root and involved area of bone necrosis were successfully eliminated under gas-oxygen anesthesia, by the window technic. This procedure was followed by exudation of free pus. Particular care was taken not to injure the vessels in the mandibular canal and mental foramen. Recovery was uneventful. However, there was a slight paresthesia, lasting for one week. All symptoms of neuralgic discomfort completely disappeared.

Comment.—This case is unusual in that the patient did not present any disturbing symptoms from the retained root until thirty-two years after the extraction. It justifies consideration of all retained roots as foreign bodies and indicates the necessity of their early removal to preclude the development of foci of infection.

516 Broad Street.

Anatomic Technic for Dentures

J. C. SHOTTON, D.D.S., Cleveland, Ohio.

WITH the technic to be described for full restoration of esthetic and anatomic values to dentures, the materials used are clear acrylic and zinc cement powder, gingival brown, dark gray and white. The lingual surfaces of all teeth are carved to full anatomic form. The tooth form should be brought out clearly in detail. When the wax has been boiled out of the denture flask, the lingual tooth form is filled in with the desired tooth shade of acrylic resin, which has been mixed very thin and blended with a little of the zinc powder of dark shade. The thin wax is practically poured into the lingual surface mold of each tooth by the use of a plastic instrument. Then, as it becomes less fluid, it is shaped so as not to go between the teeth and over the margins. It is then allowed to stand for half an hour or until it becomes hard and will not be moved when the remainder, or pink portion, of the base is pressed into the flask.

Osborn Building.

ANNOUNCEMENTS

ANNOUNCEMENTS must be received by the fifth of the month in order to be published in the forthcoming issue of THE JOURNAL.

CALENDAR OF MEETINGS

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, Cleveland, Ohio, September 11-16.

AMERICAN DENTAL ASSISTANTS ASSOCIATION, October.

AMERICAN DENTAL ASSOCIATION, Chicago, Ill., October 16-18.

AMERICAN DENTAL HYGIENISTS' ASSOCIATION, October.

AMERICAN DIETETIC ASSOCIATION, Chicago, Ill., October 25-27.

AMERICAN PUBLIC HEALTH ASSOCIATION, New York, N. Y., October 3-5.

AMERICAN SOCIETY FOR THE ADVANCEMENT OF GENERAL ANESTHESIA IN DENTISTRY, New York, N. Y., October 23.

UNIVERSITY OF BUFFALO DENTAL ALUMNI ASSOCIATION, Buffalo, October 17-19.

DISTRICT OF COLUMBIA DENTAL SOCIETY, second Tuesday in each month, at the Medical Society Auditorium, Washington.

GREAT LAKES SOCIETY OF ORTHODONTISTS, Toledo, Ohio, October 23-24.

MID-CONTINENT DENTAL CONGRESS, St. Louis, Mo., October 30-November 1.

MONTREAL DENTAL CLUB ANNUAL FALL CLINIC, October 25-27.

NATIONAL BOARD OF DENTAL EXAMINERS, July 31-August 1.

NATIONAL DENTAL ASSOCIATION, Cleveland, Ohio, August 14-18.

NEW YORK INSTITUTE OF CLINICAL ORAL PATHOLOGY, New York, N. Y., October 30.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA, Pittsburgh, October 17-19.

GREATER NEW YORK DENTAL MEETING, December 4-8.

NEW YORK SOCIETY OF ORTHODONTISTS, New York, November 13-14.

WOMEN'S DENTAL SOCIETY OF NEW YORK, New York, N. Y., September 20 and November 15.

STATE SOCIETIES

September

Southern California, at Los Angeles (19-21)

March 1945

Wisconsin (19-21)

April 1945

Oklahoma, at Oklahoma City (15-18)

May 1945

Massachusetts, at Boston (14-17)

STATE BOARDS OF DENTAL EXAMINERS

Alabama, at Birmingham, September 25. Farrar McCrummen, Woodward Bldg., Birmingham, Secretary.

Arizona, at Phoenix, October 9. R. K. Trueblood, 25 N. Second Ave., Glendale, Secretary.

Arkansas, at Little Rock, August 21-24. Clarence W. Koch, 717 Donaghey Bldg., Little Rock, Secretary.

Florida, at Jacksonville, September 18-21. A. W. Kellner, P. O. Box 155, Hollywood, Secretary.

Kentucky, at Louisville, September 12-15. W. F. Walz, 1114 First Nat'l Bank Bldg., Lexington 3, Secretary.

Nebraska, at Lincoln, August 22-25; Omaha, September 25-28. Oscar F. Humble, Director.

North Carolina, at Raleigh, September 25. Wilbert Jackson, Rich Bldg., Clinton, Secretary.

Ohio, at Cleveland, September 11-13, or Columbus, October 9-11 (practical examination for dental candidates); at Columbus, October 12-14 (theory examinations for dental and dental hygiene candidates); at Columbus, October 10 (practical examination for dental hygiene candidates). Earl D. Lowry, 79 E. State St., Columbus, Secretary.

Pennsylvania, at Philadelphia and Pitts-

burgh, September 25-30. Reuben E. V. Miller, 61 N. Third St., Easton, Secretary.

South Carolina, at Columbia, October 2-4. T. C. Sparks, 1508 Washington St., Columbia 23, Secretary.

Tennessee, at Memphis, September 12-16. Russell L. Moore, Dyersburg, Secretary.

Texas, at Houston, September 12-15. R. T. Weber, 311 Norwood Bldg., Austin 16, Secretary.

Virginia, at Richmond, October 24. John M. Hughes, Medical Arts Bldg., Richmond, Secretary.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE American Association for the Advancement of Science will meet in Cleveland, Ohio, September 11-16. The Dental Subsection of the association will present a symposium on dental caries and fluorine September 11.

PAUL C. KITCHIN, *Secretary,*
Subsection on Dentistry,
Ohio State University,
College of Dentistry.

AMERICAN ASSOCIATION OF ENDODONTISTS

THE objects of the American Association of Endodontists are (1) to promote the interchange of ideas on methods of pulp conservation and root-canal treatment; (2) to promote research studies, both clinical and laboratory, among its members; (3) to assist in establishing local root-canal study clubs, and (4) to help maintain a high standard of root-canal practice within the dental profession by disseminating information through lectures, clinics, publications, etc. Although it is not the object of the organization to promote root-canal therapy as a specialty of dentistry, specialization in this field by any of its members will not be discouraged. Those interested may apply for an application for membership to

LOUIS I. GROSSMAN, *Secretary,*
4001 Spruce St.,
Philadelphia 4, Pa.

AMERICAN DENTAL ASSISTANTS ASSOCIATION

THE Twentieth Annual Session of the American Dental Assistants Association will be held in October. For further information, address

AILEEN M. FERGUSON,
General Secretary,
709 Centre St.,
Jamaica Plain, Mass.

AMERICAN DENTAL ASSOCIATION

THE next annual meeting of the House of Delegates of the American Dental Association will be held in Chicago, Ill., October 16-18.

HARRY B. PINNEY, *Secretary,*
222 East Superior St.,
Chicago 11, Ill.

AMERICAN DENTAL HYGIENISTS' ASSOCIATION

THE twentieth annual meeting of the House of Delegates and the Board of Trustees of the American Dental Hygienists' Association will be held in October.

A. REBEKAH FISK, *Secretary,*
1704 North Troy St.,
Arlington, Va.

AMERICAN DIETETIC ASSOCIATION

THE annual meeting of the American Dietetic Association will be held at the Palmer House, Chicago, Ill., October 25-27. The sessions will be devoted to discussion of plans and problems relating to food and nutrition in connection with the war. Topics will include progress of the acceleration program to increase the number of qualified dietitians; improvement in methods in teaching student nurses; recruitment of dietitians for the Army; administrative food problems; newer developments in diet therapy; maternal and child nutrition; school lunch problems; rationing and food supplies; labor policies in food service units, and technology of foods. Details will be released as they develop.

AMERICAN PUBLIC HEALTH ASSOCIATION

THE Executive Board of the American Public Health Association announces the Second Wartime Public Health Conference and the seventy-third annual business meeting in New York, N. Y., October 3-5. Meetings of related organizations will take place October 2. Headquarters, Hotel Pennsylvania. The scientific program will be devoted to wartime emergency matters as they affect public health. The chairman of the

Local Committee in Charge of Arrangements is Ernest L. Stebbins, M.D., health commissioner of New York City. The chairman of the program committee is Reginald M. Atwater, M.D.

WILLIMINA RAYNE WALSH,
Associate Secretary,
1730 Broadway,
New York 19, N. Y.

AMERICAN SOCIETY FOR THE ADVANCEMENT OF GENERAL ANESTHESIA IN DENTISTRY

THE fall meeting of the American Society for the Advancement of General Anesthesia in Dentistry will be held October 23 at the Hotel McAlpin, New York. George F. Seeman, president, of Nashville, Tenn., will preside. Dinner will be served at 7 p.m. at the McAlpin, with the scientific session at 8:30. M. Hillel Feldman, New York, will speak on the every-day problems in the field of general anesthesia in dental surgery. Members of the profession are invited.

M. HILLEL FELDMAN, *Secretary,*
730 Fifth Ave.,
New York, N. Y.

UNIVERSITY OF BUFFALO DENTAL ALUMNI ASSOCIATION

THE forty-third annual meeting of the University of Buffalo Dental Alumni Association will be held October 17-19 at the Hotel Statler, Buffalo. The Eighth District Dental Society of the State of New York is cooperating in preparation of the program. Members of the profession are invited.

EDGAR L. RUFFING, *Chairman,*
Press & Publications,
233 West Ferry St.,
Buffalo.

DISTRICT OF COLUMBIA DENTAL SOCIETY

THE District of Columbia Dental Society holds its meetings on the second Tuesday of every month, at the Medical Society Auditorium, 1718 M. St., N.W., Washington.

J. WALTER BERNHARD, *Secretary,*
1835 Eye St., N.W.,
Washington.

GREAT LAKES SOCIETY OF ORTHODONTISTS

THE next meeting of the Great Lakes Society of Orthodontists will be held October 23-24 at the Commodore Perry Hotel, Toledo, Ohio.

C. EDWARD MARTINEK, *Secretary,*
661 Fisher Bldg.,
Rochester, N. Y.

MID-CONTINENT DENTAL CONGRESS

THE annual Mid-Continent Dental Congress, sponsored by the St. Louis Dental Society, will be held at the Hotel Jefferson, October 30-November 1.

HENRY F. WESTHOFF, *Chairman,*
Publicity Committee,
Missouri Theatre Bldg.,
St. Louis, Mo.

TWENTIETH ANNIVERSARY—MONTREAL FALL CLINIC

THE program for the 20th anniversary meeting, which will be held on October 25, 26 and 27 is rapidly taking form, and at this point would appear to be well up to the standard set by previous meetings. Among the clinicians appearing on the program will be: R. O. Dingman, Ann Arbor, Mich., "Oral Surgery"; E. R. Granger, Mount Vernon, N. Y., "Oral Diagnosis"; R. D. Sommer, Ann Arbor, Mich., "Root Canal Therapy"; S. A. MacGregor, Toronto, Ontario, "Children's Dentistry."

It is anticipated that several clinicians and essayists from the Canadian Dental Corps will also participate in the program, through the courtesy of Brig. F. M. Lott, Director General of Dental Service. Further details of the program will appear in the near future.

Table clinics, group clinics, educational films and a large and diversified commercial exhibit will round out the program.

Any dentist, in good standing, who is not on the mailing list of the Montreal Dental Club and who wishes to obtain further particulars on this meeting should forward his name and address to the chairman.

M. L. DONIGAN,
1414 Drummond Street,
Montreal, Canada.

NATIONAL BOARD OF DENTAL EXAMINERS

THE National Board of Dental Examiners will hold its next two sessions for the examination of candidates in Parts 1 and 2, July 31-August 1 in schools where there are five

or more candidates. For further information, address

GORDON L. TEALL, *Secretary,*
Box 71,
Hiawatha, Kan.

NATIONAL DENTAL ASSOCIATION

THE National Dental Association will hold its thirtieth annual session August 14-18 at the New Central High School, Cleveland, Ohio. For further information, address

J. A. JACKSON, *Secretary,*
Charlottesville, Va.

NEW YORK INSTITUTE OF CLINICAL ORAL PATHOLOGY

THE New York Institute of Clinical Oral Pathology will hold its first open meeting at the New York Academy of Medicine, October 30, in Hosack Hall. A symposium on "Fluorine and Dental Caries" will be presented. Dentists, physicians and public health workers are invited. For further information, address

G. ROISTACHER, *Executive Secretary,*
101 East 79th St.,
New York, N. Y.

ODONTOLOGICAL SOCIETY OF WESTERN PENNSYLVANIA

THE Odontological Society of Western Pennsylvania will hold its annual meeting at the William Penn Hotel, Pittsburgh, October 17-19.

W. EARLE CRAIG, *Secretary,*
Suite 206, Jenkins Bldg.,
Pittsburgh 22.

GREATER NEW YORK DENTAL MEETING

THE Greater New York Dental Meeting will be held at the Hotel Pennsylvania, New York, December 4-8.

WILLARD S. BELL, *Chairman,*
Press and Publication Committee,
Room 106A, Hotel Pennsylvania,
New York.

NEW YORK SOCIETY OF ORTHODONTISTS

THE next meeting of the New York Socity of Orthodontists will be held at the Waldorf-Astoria Hotel, New York, November 13-14.

NORMAN L. HILLYER, *Secretary,*
Professional Bldg.,
Hempstead.

WOMEN'S DENTAL SOCIETY OF NEW YORK

THE next meeting of the Women's Dental Society of New York will be held September 20 at the Pennsylvania Hotel at 8 p.m. Carlton Frederichs will speak on "Victuals, Vitamins and Victory."

MATHILDE FREUND, *Chairman,*
Publicity Committee,
Scarsdale.

SOUTHERN CALIFORNIA STATE DENTAL ASSOCIATION

THE annual meeting of the Southern California State Dental Association will be held at the Biltmore Hotel, Los Angeles, September 19-21.

ROBERT L. BORLAND, *Secretary,*
1052 W. 6th St.,
Los Angeles 14.

MASSACHUSETTS DENTAL SOCIETY

THE 1945 meeting of the Massachusetts Dental Society will be held at the Statler Hotel, Boston, May 14-17.

P. E. ADAMS.

OKLAHOMA STATE DENTAL SOCIETY

THE Oklahoma State Dental Society will hold its 1945 meeting in Oklahoma City April 15-18.

E. W. WISE, *Secretary.*

WISCONSIN STATE DENTAL SOCIETY

THE 1945 meeting of the Wisconsin State Dental Society, the Diamond Jubilee, will be held March 19-21, 1945.

BOARD OF DENTAL EXAMINERS OF ALABAMA

THE Board of Dental Examiners of Alabama will conduct its next dental examination beginning September 25 at Birmingham. Credentials and fees must be in the hands of the secretary two weeks in advance of the examination. For application blanks and further information, address

FARRAR MCCRUMMEN, *Secretary,*
1005-1006 Woodward Bldg.,
Birmingham.

ARIZONA STATE DENTAL BOARD

THE next examinations to be conducted by the Arizona State Dental Board will be held in Phoenix commencing October 9. All credentials must be in the office of the

secretary by September 25. Address all communications to

R. K. TRUEBLOOD, *Secretary*,
25 N. Second Ave.,
Glendale.

ARKANSAS STATE BOARD OF DENTAL EXAMINERS

THE next meeting of the Arkansas State Board of Dental Examiners will be held at the Hotel Marion, Little Rock, August 21-24. Applications must be filed with the secretary at least ten days prior to the meeting.

CLARENCE W. KOCH, *Secretary*,
717 Donaghey Bldg.,
Little Rock.

FLORIDA STATE BOARD OF DENTAL EXAMINERS

THE Florida State Board of Dental Examiners will hold its next examination of applicants for license to practice dentistry or dental hygiene in Florida at Jacksonville in the Seminole Hotel, September 18-21. Dental candidates must file preliminary applications by July 18. Final applications for dental and dental hygiene candidates must be complete by August 18. Address all communications to

A. W. KELLNER, *Secretary*,
P. O. Box 155,
Hollywood.

KENTUCKY STATE BOARD OF DENTAL EXAMINERS

THE next meeting of the Kentucky State Board of Dental Examiners will be held September 12-15 at the University of Louisville Dental School, Louisville. Dentists graduated prior to 1944 must file applications, complete with full information requested, at this office not later than July 12. Applications of 1944 graduates must be in this office by August 12. Dental hygienists must have completed a two-year course and their applications must be filed before August 12. For application forms and further information, address

W. F. WALZ, *Secretary*,
1114 First Nat'l Bank Bldg.,
Lexington 3.

NORTH CAROLINA STATE BOARD OF DENTAL EXAMINERS

THE next meeting of the North Carolina State Board of Dental Examiners for the examination of applicants for licensure will be held at the State Capitol, Raleigh, beginning September 25. Applications must be filed with the secretary thirty days before the examination. For application blanks and further information, address,

WILBERT JACKSON, *Secretary*,
Rich Bldg.,
Clinton.

OHIO STATE DENTAL BOARD

THE practical examination of the Ohio State Dental Board will be held at Western Reserve University School of Dentistry, Cleveland, September 11-13 and at Ohio State University College of Dentistry, Columbus, October 9-11. The practical examination may be taken either in Cleveland or in Columbus provided due notice is given to the secretary. The practical examination for dental hygiene candidates will be held October 10 at Ohio State University College of Dentistry, Columbus. The theory examination for both dental and dental hygiene applicants will be held in Columbus, October 12-14. All applications for these examinations must be in the hands of the secretary not later than September 28 and no application will be accepted after that date. For further information, apply to

EARL D. LOWRY, *Secretary*,
79 E. State St.,
Columbus.

DENTAL COUNCIL AND EXAMINING BOARD OF THE COMMONWEALTH OF PENNSYLVANIA

THE Dental Council and Examining Board of the Commonwealth of Pennsylvania will meet in Philadelphia and Pittsburgh September 25-30 to examine applicants for licensure to practice dentistry. For further information and application blanks, address the Department of Public Instruction, Bureau of Professional Licensing, Dental Division, Harrisburg.

REUBEN E. V. MILLER, *Secretary*,
61 N. Third St.,
Easton.

SOUTH CAROLINA STATE BOARD OF DENTAL EXAMINERS

THE South Carolina State Board of Dental Examiners will hold its next meeting in Columbia, October 2-4. All applications

must be filled out and returned to the secretary at least thirty days before the date on which the examinations are to begin.

T. C. SPARKS, *Secretary,*
1508 Washington St.,
Columbia 23.

TENNESSEE BOARD OF DENTAL EXAMINERS

THE Tennessee Board of Dental Examiners will hold its next examination September 12-16, at the University of Tennessee, College of Dentistry, Memphis, for licensure in dentistry or oral hygiene. Applications must be in the hands of the secretary at least thirty days before the date of the examination. For further information and applications, address

RUSSELL L. MOORE, *Secretary,*
Dyersburg.

TEXAS STATE BOARD OF DENTAL EXAMINERS

THE next examination of the Texas State Board of Dental Examiners will be held in Houston, September 12-15, with headquarters in the Rice Hotel. The board has adopted a new form of application blank, now available on application to the secretary. One of the new requirements will be a photostatic copy of the candidate's birth certificate, to be attached to the application. This will establish citizenship. If the applicant has been naturalized, he will have to submit pertinent information giving the number of the certificate, the court and the date, at the time he applies, and present his original papers at the meeting of the board. These forms must be in the hands of the executive secretary at least thirty days before the examination.

R. T. WEBER, *Secretary,*
311 Norwood Bldg.,
Austin 16.

VIRGINIA STATE BOARD OF DENTAL EXAMINERS

THE next regular meeting of the Virginia State Board of Dental Examiners will be held at the Medical College of Virginia, Richmond, beginning at 9 a. m., October 24, instead of September 19 as formerly announced. No applications will be accepted after October 7. Incomplete applications will be declined and returned. For application blanks and further information, apply to

JOHN M. HUGHES, *Secretary,*
715 Medical Arts Bldg.,
Richmond.

ALPHA OMEGA

ALL Massachusetts members of Alpha Omega in service, both in this country and abroad, are requested to communicate with Abraham Gurvitz, War Service Committee, Alpha Omega Fraternity, 371 Commonwealth Ave., Boston 15, Mass.

SAMUEL S. HIRSON, *Secretary,*
Boston Alumni Chapter,
471 Commonwealth Ave.,
Boston, Mass.

RESIDENCIES IN DENTISTRY

THERE will be available July 1 two full-year residencies in dentistry at the Sea View Hospital, Staten Island, New York, N. Y., each with a stipend of $1,200 annually plus maintenance. Sea View Hospital, probably the large tuberculosis hospital in the world, offers unusual facilities in the various phases of dentistry. Those interested should communicate with

RALPH HOWARD BRODSKY, *Director,*
Division of Oral Surgery,
14 East 81st St.,
New York 28, N. Y.

INTERNSHIP AND VOLUNTEER EXTERNSHIPS

THERE is an internship, as well as several volunteer externships, available for recent graduates in the Dental Department of the Bronx Hospital. Opportunity is offered for training and experience in oral surgery and exodontia, orthodontia, periodontia, endodontia (root-canal therapy) and operative dentistry. Application forms can be obtained by communicating with S. Berton Gerstner, Director, Dental Department, Bronx Hospital, Fulton Ave. at 169th St., Bronx 56, N. Y.

DENTAL INTERNSHIPS

Two internships are available at the St. Louis City Hospital for recent dental graduates. Opportunity is afforded for training and experience in dental and oral surgery, diagnosis and other phases of dentistry. Applicants should address Leo J. Wade, Medical Director, or Hamilton B. G. Robinson.

D.D.S., City Hospital, 1515 Lafayette Ave., St. Louis, Mo.

DENTAL INTERNSHIPS

THE Greater New York Conference of Hospital Dental Services, comprised of a group of men who are chiefs of dental services, would like to aid those men seeking dental internships in hospitals in the metropolitan area. Those who are not in the Army or the Navy and who are desirous of obtaining internships should communicate with

MARY E. REILLY, *Secretary,*
386 Fourth Ave.,
New York, N. Y.

DENTAL INTERNSHIPS

AN internship is available to a recent dental graduate at the Research and Educational Hospital of the University of Illinois Medical Center. An unusual opportunity is afforded for training and experience in hospital dentistry and the medical aspects of dental disease. Application forms can be obtained from the Dean, University of Illinois College of Dentistry, 808 South Wood St., Chicago 12, Ill.

DENTAL INTERNSHIPS

VOLUNTEER dental externships are available in the Research and Educational Hospital to dental practitioners desiring training and experience in hospital dentistry, dentistry for children and the dental aspects of systemic disease. Application forms can be obtained from the Dean, University of Illinois College of Dentistry, 808 South Wood St., Chicago 12, Ill.

CARNEGIE FELLOWSHIPS FOR RESEARCH AND GRADUATE WORK IN THE DENTAL SCIENCES

AIDED by the Carnegie Corporation of the New York and the Eastman Dental Clinic, the School of Medicine and Dentistry of the University of Rochester offers scholarships paying $1,200-$1,800 per annum to well-trained dental graduates who are interested in research or who desire special training in the basic medical sciences as an aid in dental teaching or practice. A few fellowships also offer part-time training in oral surgery. On appointment, the applicant is given the title of Fellow in Dentistry and, according to his interests, works as a graduate student in one of the departments of the medical schools. Here, excellent laboratory facilities, adequate direction and close contact with various investigations related to medicine and dentistry help his research and study. Fellows are encouraged to attend medical classes, seminars and staff meetings and, when opportunity presents itself, to participate in class instruction and scientific meetings. Contact with the problems of clinical dentistry may be maintained through the Oral Surgery Clinic of the Strong Memorial Hospital and the Rochester Dental Dispensary. With the approval of the Graduate Council of the university, Fellows may prepare themselves for the degree of M.S. or Ph.D. Applications should be made to

GEORGE H. WHIPPLE, *Dean,*
Rochester, N. Y.

FEDERAL POSITIONS FOR DENTAL HYGIENISTS

THE United States Civil Service Commission is continuing to recruit dental hygienists for federal positions. Experience is no longer necessary.

Completion of a full course leading to graduation from a recognized school of oral hygiene and registration as a dental or oral hygienist in a state, territory or the District of Columbia will qualify applicants.

Students enrolled in schools of oral hygiene may apply for federal positions when they are within nine months of completion of the course and may enter on duty on completion and registration. There are no age limits for the positions and no written tests. Appointees receive $1,970 a year entrance salary, which incorporates compensation for the eight hours of overtime included in the present forty-eight hour federal work week. The majority of positions are in Army hospitals and dispensaries throughout the country, particularly in the West and Southwest. Vacancies may occur also in the Veterans Administration and the Public Health Service. Applications should be filed with the Civil Service Commission, Washington 25, D. C.

W. C. HULL, *Executive Assistant,*
United States Civil Service Commission,
Washington, D. C.

POSTGRADUATE COURSE IN ROENTGENOLOGY

THE College of Dentistry of Ohio State

University offers an additional postgraduate course in roentgenology, beginning September 25-29.

WENDELL D. POSTLE, *Dean,*
Columbus 10, Ohio.

DENTAL HYGIENE COURSE

A NEW course will be offered for dental hygienists at Ohio State University, beginning with the autumn quarter, October 3. The requirements for admission are the same as for admission to the College of Arts and Science. This is a two year course, leading to a certificate of graduate dental hygienist. The fee is $50 per quarter.

WENDELL D. POSTLE, *Dean,*
Columbus 10, Ohio.

CHICAGO DENTAL SOCIETY FOURTH ANNUAL PRIZE ESSAY COMPETITION

To encourage continued scientific research in all phases of dentistry, the Chicago Dental Society again offers a cash prize of $500 to the author of the most meritorious essay reporting an original investigation and containing new and significant material of value to dentistry.

The winner of the award will be invited to present his essay at the eighty-first Midwinter Meeting of the Chicago Dental Society, to be held in Chicago during February 1945. The expense of the winner will be paid by the society and will be in addition to the prize of $500.

Any member of the American Dental Association or of a recognized foreign dental society, or any one affiliated with a recognized institution in the dental field may apply for authorization to enter the competition. The contest is not limited to research men having technical staffs and elaborate equipment at their disposal, but is open to any qualified person who believes that he has something new and important to contribute to dentistry. The rules are simple and fair and all contestants, whether students, teachers or practitioners, have an equal opportunity.

Application forms and contest rules can be obtained by writing to the Chicago Dental Society, 30 N. Michigan Ave., Chicago 2, Ill. All applications must be filed in the office of the society by October 2, 1944.

STATE OF NEBRASKA BUREAU OF EXAMINING BOARDS

THE next dental examinations in the State of Nebraska will be given August 22-25 at the university in Lincoln, in the college of dentistry, and September 25-28 at Creighton University College of Dentistry, Omaha. Applications for these examinations must be filed with the office of the Bureau of Examining Boards, Room 1009, State Capitol Bldg., Lincoln, at least fifteen days before the first day of the examination.

OSCAR F. HUMBLE, *Director.*

EXAMINATION FOR APPOINTMENT IN THE DENTAL CORPS, REGULAR NAVY

THE next examination for appointment as Assistant Dental Surgeon, U. S. Navy (lieutenant, junior grade, Dental Corps, U. S. Navy) will be held at the Naval Training Station, Norfolk, Va., the Naval Training Center, Great Lakes, Ill., the Naval Training Center, San Diego, Calif., and the Naval Dental School, National Naval Medical Center, Bethesda, Md., October 16. Application for this examination should be made to the chief of the Bureau of Medicine and Surgery, Navy Department, Washington, D. C. Applicants for appointment as Assistant Dental Surgeon must be citizens of the United States, more than 21, but less than 32 years of age at the time of acceptance of appointment and graduates of a class A dental chool. A circular of information listing physical and other requirements for appointment, subjects in which applicants are examined and other data pertaining to salary, allowances, etc., can be obtained from the Bureau of Medicine and Surgery, Navy Department, Washington, D. C., on request.